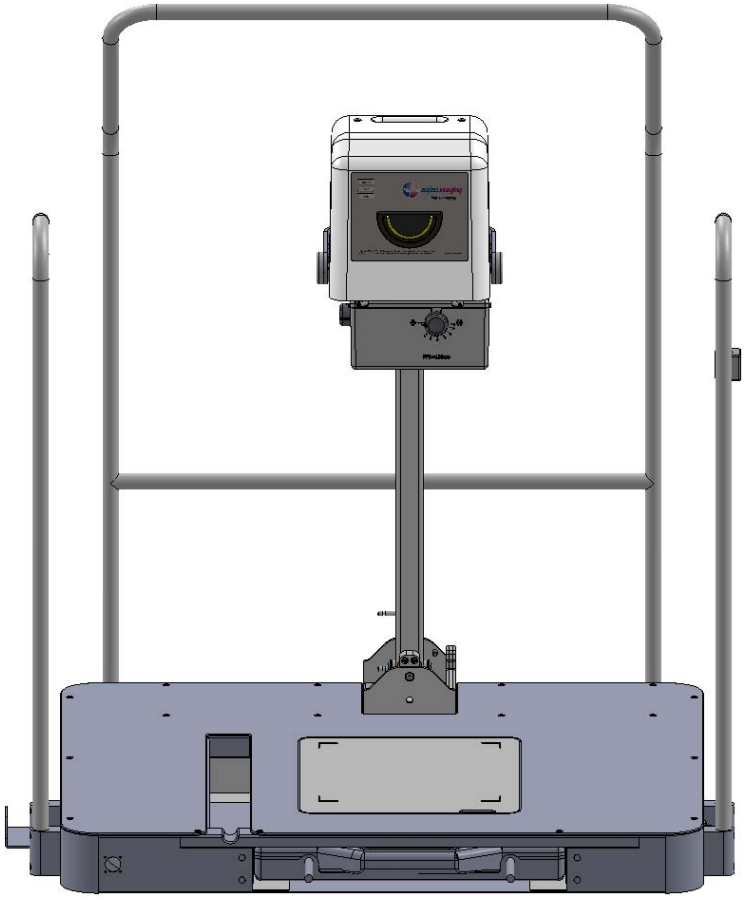
Model PXS-710D
Podiatry X-Ray System

Installation/Operation Manual

Rev. 4 (S/N 140 - ...)



Manufactured By

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100206	Schematic, Generator	55

LIST OF SYMBOLS

Symbol	DESCRIPTION
	Exposure Switch
	For Human Use
	Protective Earth
	Attention, Consult Accompanying Documents
	Pinch Point, Keep Hands Clear
Only	Prescription Use (Part 21 CFR 801 Subpart D)

REVISION CONTROL					
Rev	**Description**	**Initiated By**	**Date**	**Approved By**	**Date**
0	Initial Release	M. Eder	11/25/13	R. Manez	12/20/13
1	Corrected typos	R. Manez	12/4/14	V. Milonas	12/5/14
2	Updated Fig 3.5, Corrected callout ID's	M. Eder	1/13/15	V. Milonas	1/13/15
3	Updated un-packaging procedure	S. Lopez	2/6/15	R. Manez	2/6/15
4	Updated drawings for yoke pivot	S. Lopez	5/5/15	R. Manez	5/6/15

GENERAL INFORMATION

1.1 INTRODUCTION

This manual is divided into five sections and contains the following information: Section I describes general information, Section II contains installation and calibration procedures. Section III contains operating procedures and technique guides. Section IV discusses theory of operation and Section V contains maintenance procedures and recommended intervals.

1.2 DESCRIPTION

The Model PXS-710D podiatry x-ray system is designed and manufactured by Source-Ray, Inc. It provides high quality radiographic capability in a lightweight small format. It is a component system consisting of the following items:

Model:PXS-710D-CG X-Ray Control/Tube Housing Assy.

Model:PXS-710D-S Podiatry Support Platform

1.3 IMPORTANT NOTICE

The equipment manufactured by Source-Ray, Inc. and covered in this manual will function properly when operated, maintained, and repaired in accordance with the instructions in this manual. Source-Ray, Inc. does not assume responsibility for any malfunctioning of this equipment resulting from improper operation, maintenance, repair, or modification of its components.

This equipment can be hazardous to both patient and operator unless established safe exposure factors are observed. Source-Ray, Inc. disclaims all responsibility from any injury resulting from improper application of this equipment.

1.4 COMPLIANCE NOTICE

The Source-Ray Model PXS-710D you have purchased has been designed, manufactured and calibrated to comply with the governing Federal Regulations 21 CFR Subchapter J. The maintenance schedules included are crucial to the continued reliability of this equipment with respect to regulatory compliance.

Rx Only	Prescription Use (Part 21 CFR 801 Subpart D)

Class I – Intermittent Mode

PXS-710D System consisting of:
X-Ray Control/Tube Housing Assy.: Model PXS-710D-CG
Specified Range of Compliance:
Tube Current: 10 mA
Tube Voltage: 40 - 70 kVp
mAs Range: 0.10 - 20.0 mAs

1.5 SAFETY STANDARDS

The Source-Ray equipment you have purchased has been designed, manufactured, and calibrated to meet the following safety standards:

	Model: PXS-710D-CG With Respect To Electric Shock Fire, And Mechanical Hazards Only	**In Accordance With** CAN/CSA C22.2 No. 601.1 UL 60601-1, IEC 60601-2-7 & IEC 60601-2-28

The Model PXS-710D is designed to comply with IEC 60601-1-2.

1.6 ELECTRICAL SPECIFICATIONS

MILLIAMPERES

Milliamperes will not deviate from the selected value by more than +/- 5% within the operating line voltage range and within the specified range of line voltage regulation.
Measurements made with an Inovision mAs meter model 35035 or equivalent at 1.0 second.

KILOVOLTS

Kilovoltage will not deviate from the selected value by more than +/- 5% of full scale
Measurements made with an Unfors Xi Mult-O-meter or equivalent.

1.6 Continued:

MAS

MAS will not deviate from the selected value more than +/- 8% plus +/- 0.2 mAs within a range of 0.10 – 20.0 mAs. Measurements made with a Fluke Biomedical mAs meter model 35035 or equivalent.

MAXIMUM RATING

10 mA at 70 kVp DC

LINE VOLTAGE REGULATION

5% maximum as measured at the x-ray control panel at maximum rated output

REQUIRED APPARENT RESISTANCE OF SUPPLY MAINS

115 ~ - 0.88 Ω

MAXIMUM LINE CURRENT (10 mA at 70 kVp).

Momentary: 13 A, Long Term: 4 A at 115 ~ (AC)

Measurements made with a FLUKE 179 True RMS DVM and a FLUKE Y1801 clamp-on current probe adaptor.

LINE VOLTAGE RANGE

115 ~ (103.5 - 126.5 AC) 50/60 Hz

NOMINAL ELECTRIC POWER

700 Watt, Constant potential derived from a high frequency inverter system, Regulated for both kVp and mA.

MINIMUM PERMANENT FILTRATION

1.8 mm of aluminum equivalent at 70 kVp

1.6 Continued:

SOURCE TO IMAGE DISTANCE (SID)

Fixed: 30" AP, 36" Lateral

REFERENCE CURRENT TIME PRODUCT (Power On Defaults)

Beam Current: 10 mA

Tube Potential: 60 kVp

mAs Setting: 1.60 mAs

LEAKAGE TECHNIQUE FACTORS

Testing is performed at 70 kVp and 10 mA, 20 mAs exposure, every 1 minute.

COOLING CURVES

Automatic inhibit circuits provide a delay between exposures proportional to the exposure time. This delay is sufficient to allow proper tube cooling. The delay between exposures varies between 0.10 seconds and 20 seconds depending on the exposure time

COLLIMATOR

Manual Ralco R72

ENVIRONMENTAL

Operating Temperature: 40 - 90 Deg. F. / 5 - 32 Deg. C

Storage Temperature: 30 - 110 Deg. F. / -1 - 43 Deg. C

1.7 X-RAY TUBE CHARACTERISTICS

X-RAY TUBE TYPE

SXR-90-15-0.5

ENVELOPE

Hard glass. Borosilicate 0.085 thick.

ANODE MATERIAL

Tungsten target, copper plated and vacuum cast in copper.

TARGET ANGLE

15 DEGREE.

FOCAL SPOT

0.5 mm nominal as per N.E.M.A. XR-5.

CATHODE

Tungsten filament, line focus.

INHERENT FILTRATION

Minimum 0.65 mm aluminum equivalent at 80 kVp

COOLING

Natural convection through the insulating medium to the enclosure

INSULATING MEDIUM

Highly refined transformer oil; breakdown dielectric strength of not less than 45 kVp per ASTM

D 877-49

X-RAY SHIELDING

Approximate equivalent to .062 of lead for scatter radiation.

MAXIMUM VOLTAGE

90 kVp

1.7 Continued:

MAXIMUM ENERGY

1.4 mA continuous at 90 kVp in cooled oil. Maximum temperature of oil not to exceed 70 degrees centigrade.

THERMAL

Oil insulation

ANODE HEAT STORAGE

25,000 Heat Units

ANODE COOLING RATE

200 Heat Units/Sec.

NOTE: Heat Unit = kVp x mA (average) x 1 second

1.8 MECHANICAL SPECIFICATIONS

PODIATRY SUPPORT BASE

Model: PXS-710D-S

Aluminum Equivalence
Table Top Material: Less than 1.2mm AL

Physical Size:	Length	Width	Height
	33.7 in.	39.8 in.	42.5 in.
	85.6 cm	101 cm	108 cm

Gross Weight: 113 lb., 51.2 KG

Weight Capacity: 300 lbs, 136 KG

X-RAY CONTROL/GENERATOR MODULE

Model: PXS-710D-CG

Physical Size:	Length	Width	Height
	12.6 in.	10.1 in.	13.2 in.
	32 cm	25.7 cm	33.5 cm

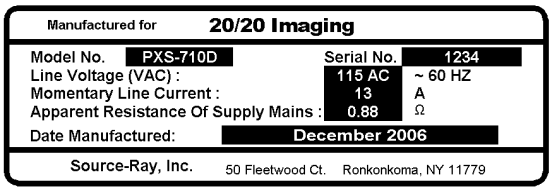
Gross Weight: 29 lb., 13.1 KG

REMOTE CONTROL MODULE (Optional)

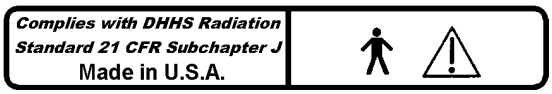
Model: RC-115

Physical Size:	Length	Width	Height
	7.30”	3.30”	1.14”

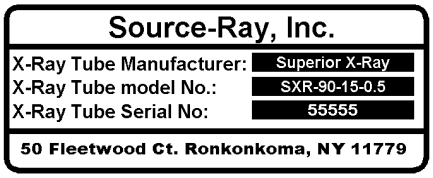
1.8 Labeling



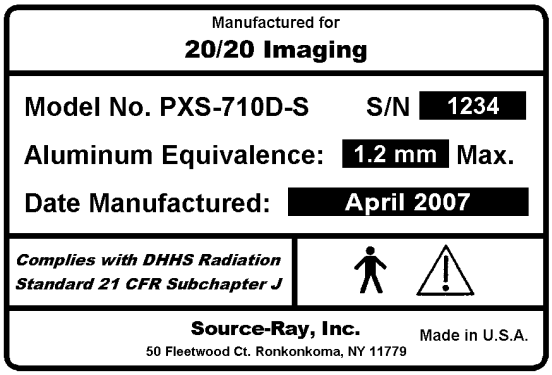
Control/Generator Label



Certification Label



X-Ray Tube Label



Podiatry Base Label

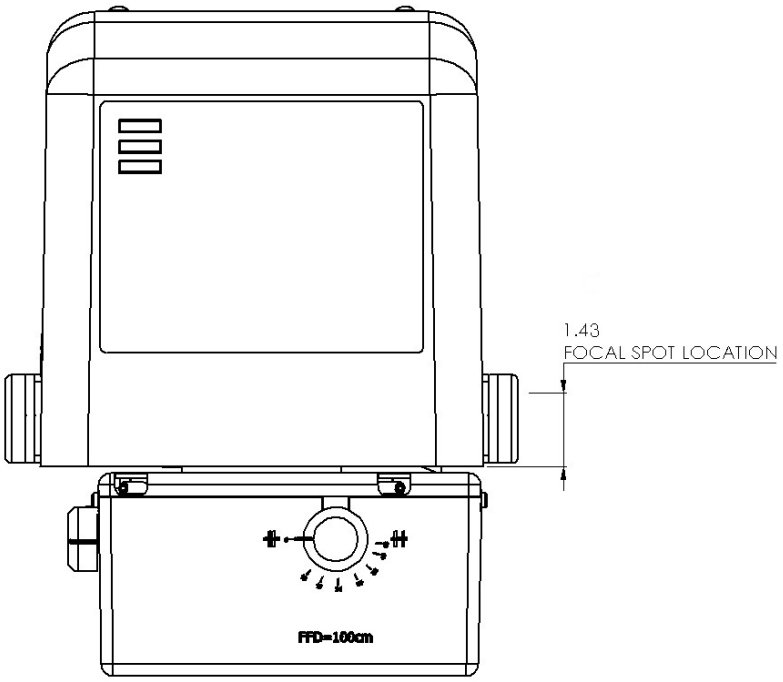


Figure 1.0

Focal Spot Dimensions

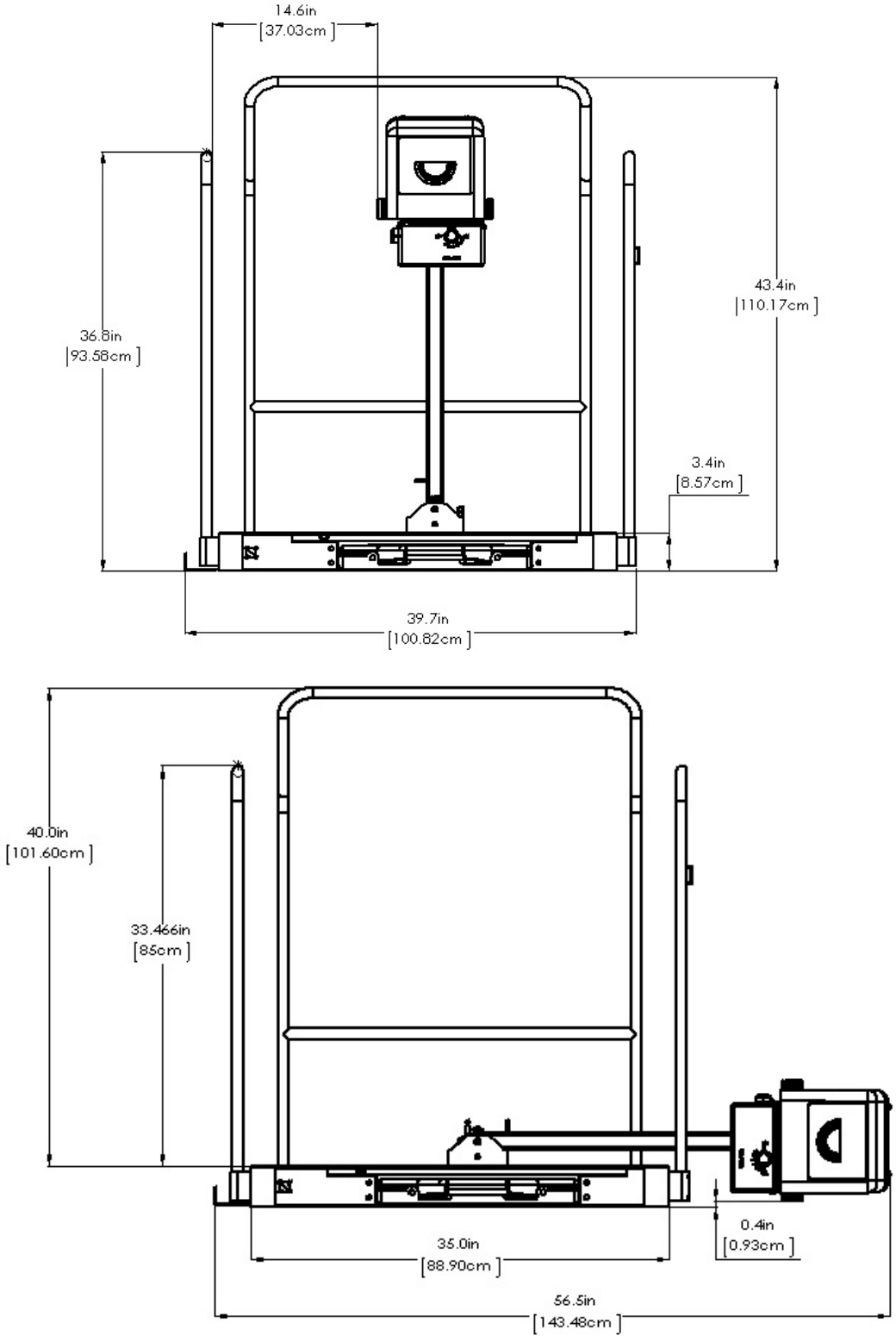


Figure 1.1

System Dimensions

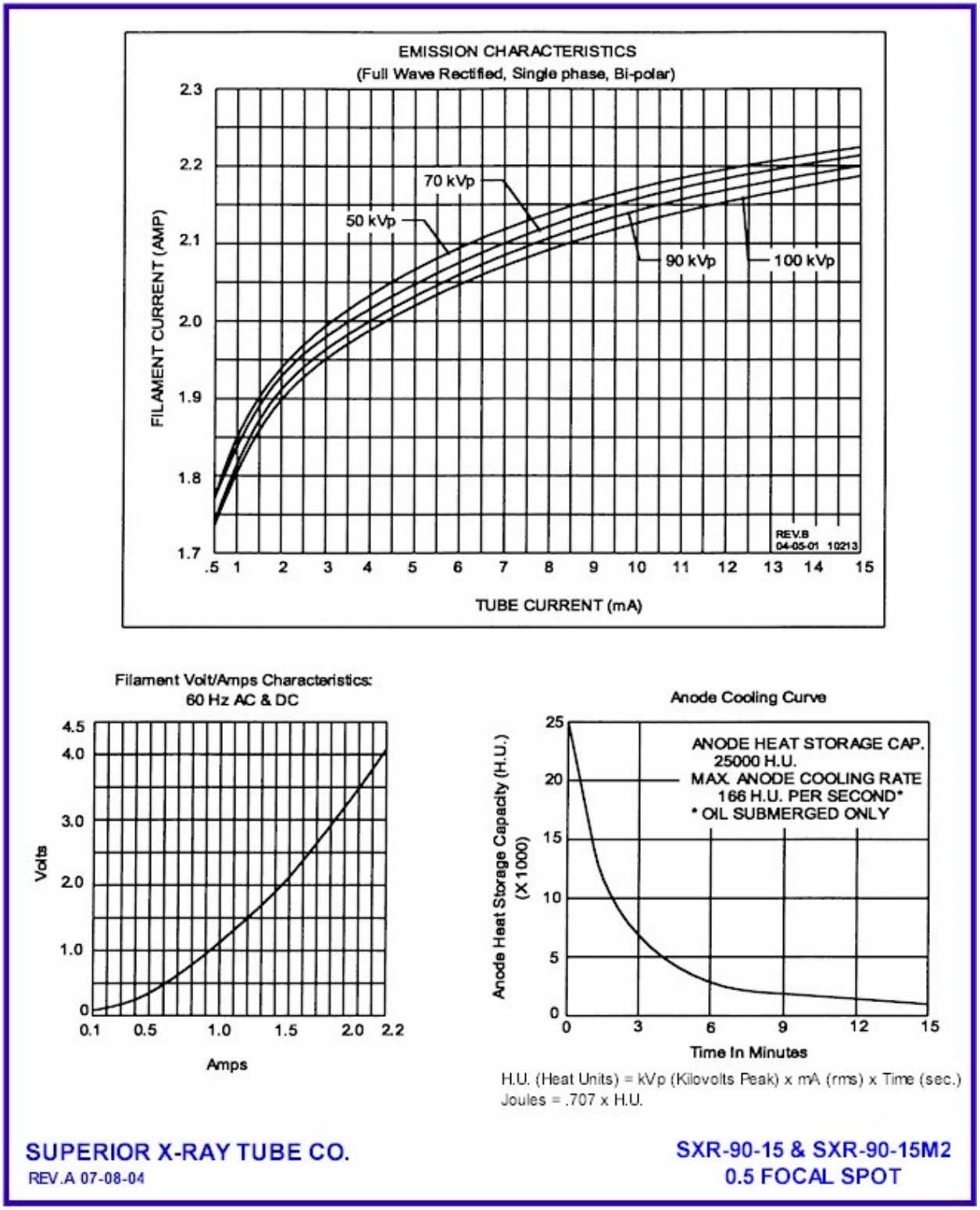
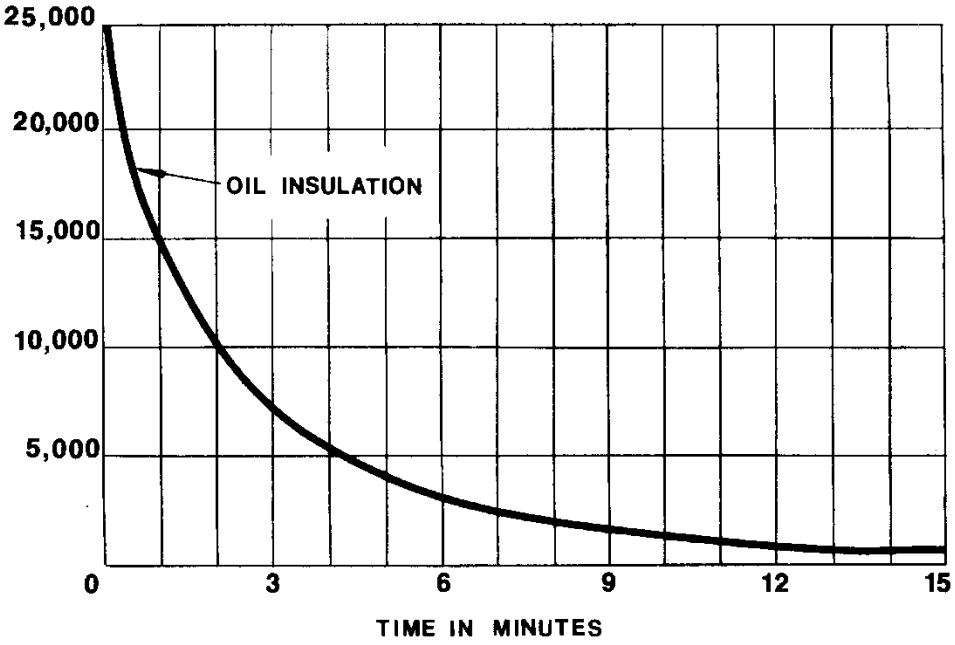
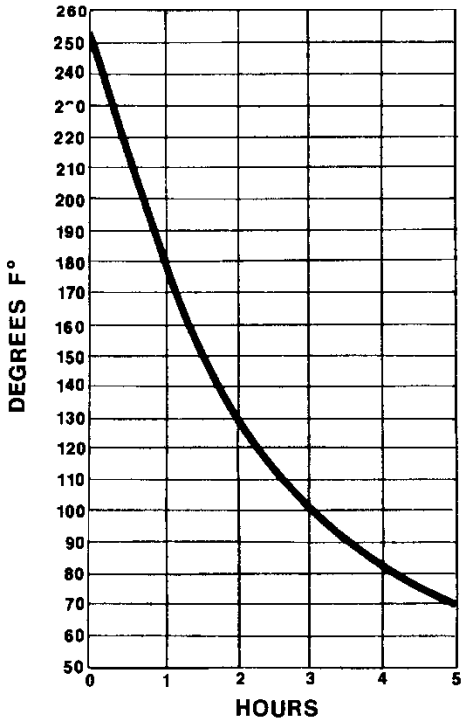


Figure 1.2
X-Ray Tube Rating Charts



X-Ray Tube Anode Cooling Curve



X-Ray Tube Head Assembly Cooling Curve

Figure 1.3

Cooling Curve, Tube Head Assembly

INSTALLATION AND CALIBRATION

CAUTION

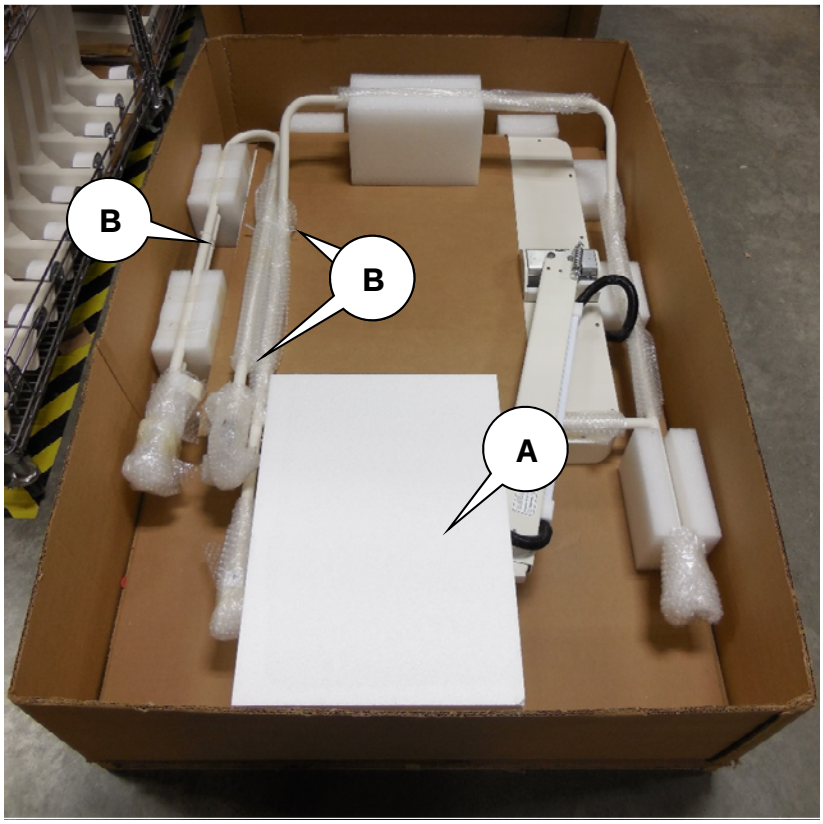
This Section Pertains To Authorized SRI Service Personnel Only

The Podiatry Support Base contains a spring-loaded arm with 500 pounds of force.

***Never** remove the X-Ray Head while the arm is in a position other than 90° (Vertical).*

2.1 UNPACKAGING

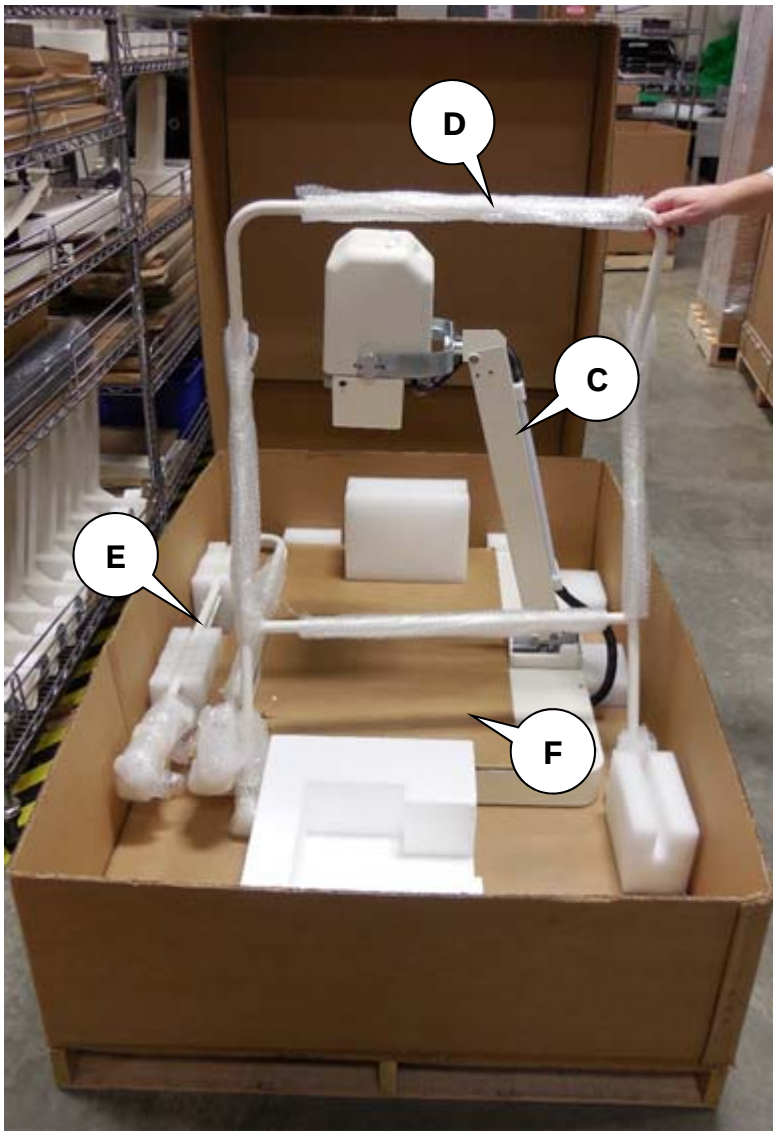
1) Remove the top carton to expose the below contents;



2) Remove the top polystyrene cushion (A), which secures the generator, and put aside.
3) Cut off the 3 cable ties located on the Patient Handrails (B).

WARNING: *The Podiatry Support Base contains a spring-loaded arm with 500 pounds of force.*

4) Lift the Arm (C) up 90° and remove the Patient Back Handrail (D) and put aside.



5) Remove the Patient Side Handrails (E) from the cushions and put aside.
6) Remove the back handrail cushion from the box.
7) Remove the Podiatry System (Model PXS-710D) from the box and put aside.

2.2 ASSEMBLY (Reference Fig. 2.1)

1) Secure the Patient Side Handrails (A) to the left and right side of the Podiatry Base (B) from the outside using 4 ea. 1/4-20 x 2" SHCS. Tighten securely.
2) Secure the Patient Back Handrail (C) to the back side of the Podiatry Base (B) from the outside using 4 ea. 1/4-20 x 2" SHCS. Tighten securely.
3) Place the Podiatry Support Base (B) in its final location.

2.3 ELECTRICAL CONNECTIONS

Caution ***Be certain that the primary power source (wall outlet) is the same rating as the voltage specified on the label, located on the under side of the Generator Assembly.***

Connect the following connections at the Control/Generator Assembly. The Base Cable Assembly attached to the Boom Arm Assembly provides connection to the System Base assembly.

Ref Fig. 3.1

1) Connect the power cord from the Base cable assembly to the power Inlet (2).
2) Connect the Remote Control Interface cable from the Base cable assembly to the Interface connector (5).
3) Connect the Exposure Switch from the Base cable assembly to the Exposure connector (3).
4) Connect the RS-232 Cable from the Base cable assembly to the RS-232 interface connector. (6)

3.1 Continued:

Connect the Following System Base connections.

Ref Fig. 3.5 & 3.6

5) Connect the power cord from the Base cable assembly to the power Inlet (D).
6) Optional, Connect the Remote Control Interface cable from the Base cable assembly to the Interface connector (B).
7) Connect the Exposure Switch from the Base cable assembly to the Exposure connector (G).
8) Connect the RS-232 Cable from the Base cable assembly to the RS-232 interface connector. (A)

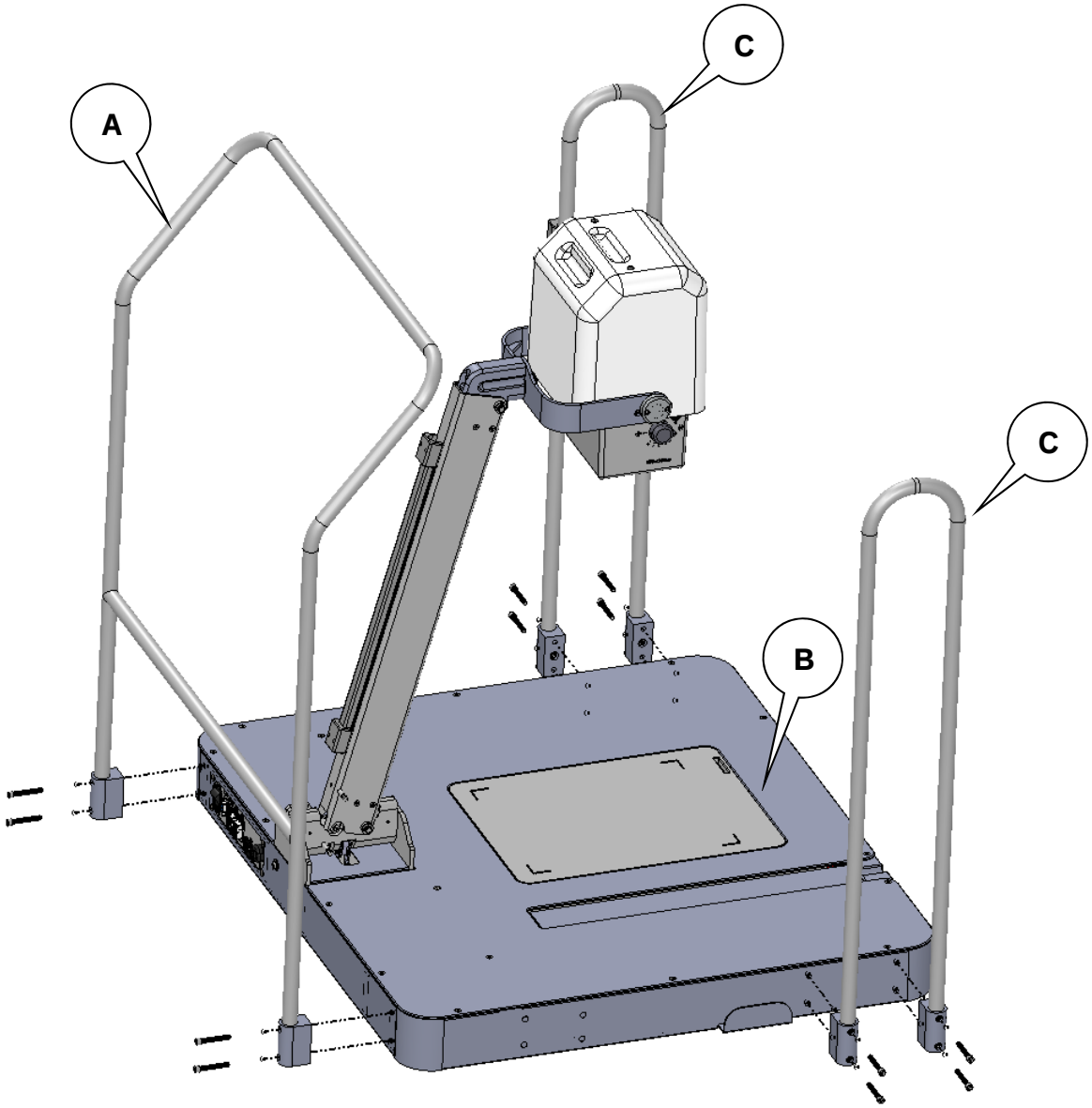


Figure 2.1
System Assembly

2.4 CALIBRATION SET-UP

Connect the mAs meter to the phone jack (J3) located on the top back plate of the Control/Generator Assy. Place the kVp meter (Unfors model 514L) in the X-Ray field @ 30" SID, and run calibration procedure.

Connect an Oscilloscope to TP7 and TP8 (GND) on the Control Board 950132.

2.5 TUBE POTENTIAL (kVp) and BEAM CURRENT (mA)

1) Micro-controller operational modes:
   - Manual Operation Mode
   - Calibration Mode

2) Manual Operation

   This is the default mode of operation, which normally appears immediately after the Power On Self Test (POST).

   To adjust kV output, use the kV Up and kV Down keys.

   To select mAs setting, use the mAs Up and mAs Down Keys.

3) Calibration Mode (with Optional Remote Control RC-115)

   To enter the Calibration Mode, Connect the Remote Control RC-115. Turn the unit ON and press "***kV Up***", "***Reset***", and "***mAs Up***" simultaneously and hold for approximately 10 seconds during the POST condition. The display will show 710, wait for the 'Chirp' and then release the keys.

   Successful entrance into the calibration mode will result in the following displays - kVp: "710", mAs: "1.00" (or whatever the current firmware version is e.g.; "2.10"). Hold "***kV Up***", "***Reset***", and "***mAs Up***" for approximately 4 seconds to enter the calibration mode.

   There are eight Calibration adjustments:
   40kVp Preheat, kVp
   50kVp Preheat, kVp
   60kVp Preheat, kVp
   70kVp Preheat, kVp

   The displays will then change to; kVp: "04", mAs: "0 – 255", indicating that the system is ready to calibrate the 40kVp Preheat setting.

Calibration Mode RC-115 (Continued)

a. Make an exposure and measure the actual mA waveform on the Oscilloscope.

b. To increase or decrease the Preheat, Press kV up or down. Each activation of the button increases or decreases the Preheat. The number displayed in the mAs window represents a digital code for Preheat reference and is increased or decreased by one with each activation of the kV switches. Adjust the Preheat until the mA waveform is square with as little overshoot or undershoot as possible.

c. When the calibration is completed for the 40 kVp Preheat range, depress the "**RESET"** to move to the kVp adjustment. The display will show 05.

d. Place a Non-invasive kVp detector in the X-Ray Beam.

e. Make an exposure and measure the actual kVp.

f. To increase or decrease the kVp, Press kV up or down. Each activation of the button increases or decreases the kVp approximately 05. kVp. The number displayed in the mAs window represents a digital code for kVp reference and is increased or decreased by one with each activation of the kV switches. Adjust the kVp until the Actual kVp is within specifications.

g. When the calibration of kVp is completed for the 40 kVp range, depress the "**RESET"** to move to the adjustment.

h. Repeat steps a – g for the 50, 60 and 70 kVp ranges. The Display will show 04,05,06,07 for the Preheat adjustments and 40,50,60,70 for the kVp adjustments.

i. Press RESET until the kVp Display shows '60'

j. Reset the MAS Meter to Zero

k. Make an Exposure and measure the actual mAs

l. Observe the reading on the MAS meter. The reading should be 1.0mAs +/- 5%. If adjustment is required, adjust R102 on the Control board assembly. Inspect squareness of wave-shape and repeat steps b - h above if necessary.

m. When calibration is complete Recycle power to the unit to return to normal operation mode

4) Calibration Mode (with PXS-710D Calibration Utility)

The PXS-710D Calibration Utility allows calibration of the PXS-710D with a host computer connected to the Serial RS-232 Port of the Generator.
The PXS-710D Calibration Utility CD-ROM is provided with this documentation.
Run the installation program and install the Utility.
The Default Serial COM port is COM1, be sure to configure the Host PC accordingly.

a. Start the PXS710D utility, PXS710D.exe . Located in the following directory: C:\Program Files\PXS-710D\

b. From the Drop-down menu select "**Cal Utils**" as shown in fig. 2.2 below.

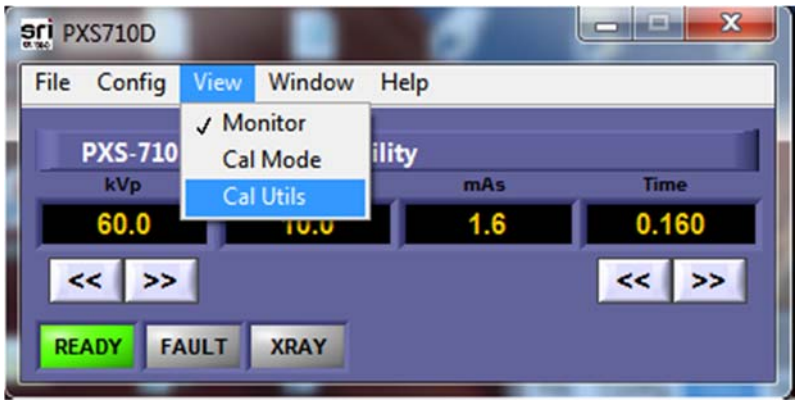


Figure 2.2
Calibration Menu

c. The Calibration Menu is password protected. In the password Dialog enter "**yarx**". Fig, 2.3

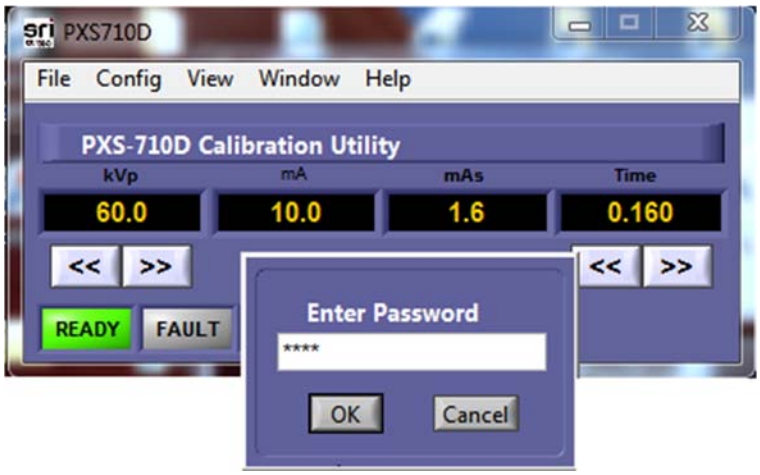


Figure 2.3
Password Dialog Box

d. Select "**Re-Calibrate XRay Controller**" from the Calibration Menu. Click '**Run**' to enter the Calibration wizard. Ref Fig. 2.4

Figure 2.4
Calibration Menu

e. The Calibration Displays the Current Calibration point, kVp, mA and Time. Ref. Fig. 2.5

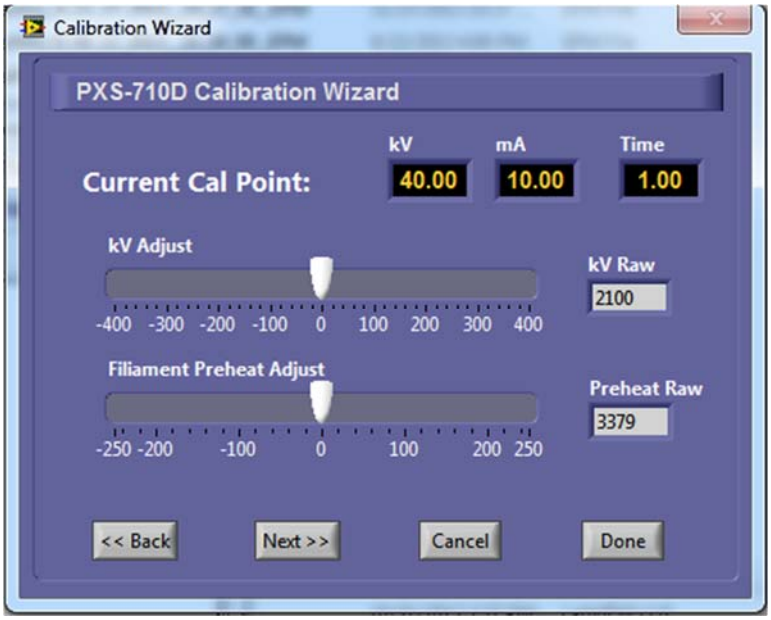


Figure 2.5
Calibration Wizard

f. Make an exposure and measure the actual mA waveform on the Oscilloscope.

g. To increase or decrease the Preheat, use the '**Filament Preheat adjust**' slider to adjust Preheat up or down. The number displayed in the Preheat Raw window represents a digital code for Preheat reference and is increased or decreased by the slider control. Adjust the Preheat until the mA waveform is square with as little overshoot or undershoot as possible.

h. Make an Exposure and verify the actual mA waveform on the Oscilloscope, Repeat step g if more adjustment is required.

i. To increase or decrease the kVp, use the '**kV adjust slider'** to adjust kV up or down. The number displayed in the kV Raw window represents a digital code for kVp reference and is increased or decreased by the slider control. Adjust the kVp until the Actual kVp is within specifications.

j. Make an Exposure and verify the actual kVp value, Repeat step i if more adjustment is required.

k. Using the attached mAs meter, measure the mAs for the 1 sec. exposure. Verify that the reading is 10.0 mAs (1.0 mAs +/- 5%). If adjustment is required, adjust R102 on the Control board assembly P/N 950132. Inspect squareness of wave-shape and repeat steps f - g above if necessary.

l. When the calibration is completed for the 40 kVp Preheat range, depress the "**NEXT"** button to move to the next calibration station. Repeat steps f – k. This process is repeated for 50, 60, and 70 kVp, as displayed in the kV window.

m. Once the 70 kVp station is calibrated, pressing "**NEXT**" results in a confirmation dialog as in fig 2.6. Click on the '**OK'** button to proceed.

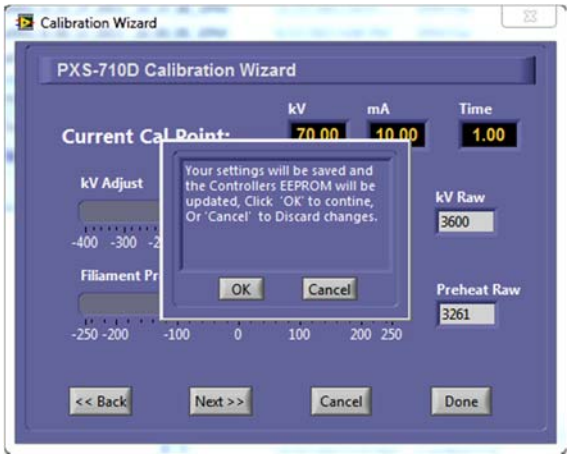


Figure 2.6
Settings Confirmation

n. Once the new calibration settings are saved, a confirmation dialog is displayed. Click on '**OK**' to proceed, you will be returned back to the "**Calibration Menu**". Ref fig 2.7

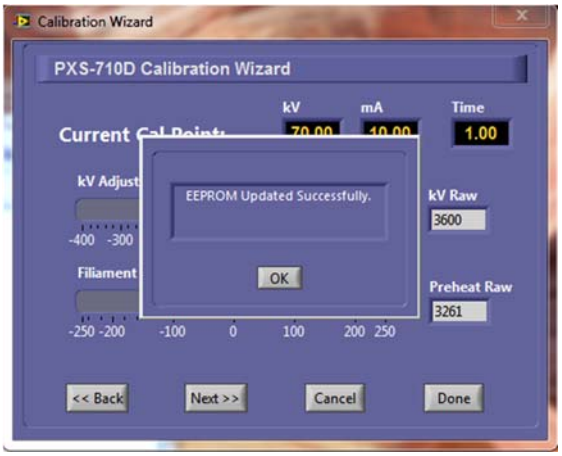


Figure 2.7
Settings Saved Confirmation

o. Exit the '**Calibration Menu**' by clicking '**EXIT**'. Ref fig 2.8

p. Exit the PXS710D.exe Calibration Utility by selecting 'File->Exit' from the drop down menu.

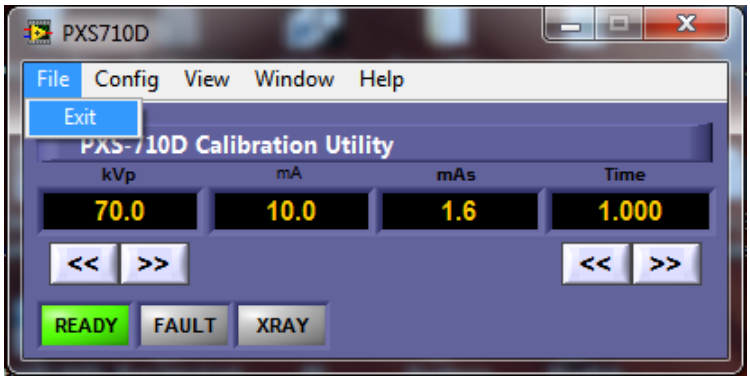


Figure 2.8
Application Exit

5) Normal Operation (with the PXS-710D Calibration Utility)

The PXS-710D Calibration Utility can be used as a standalone controller for the PXS-710D allowing setting kVp, mAs and manual Exposure control.

a. Start the PXS710D Utility, PXS710DCal.exe . Located in the following directory: C:\Program Files\PXS-710D\

b. From the Drop-down menu select, "**Cal Mode**" as shown in fig. 2.9 below.

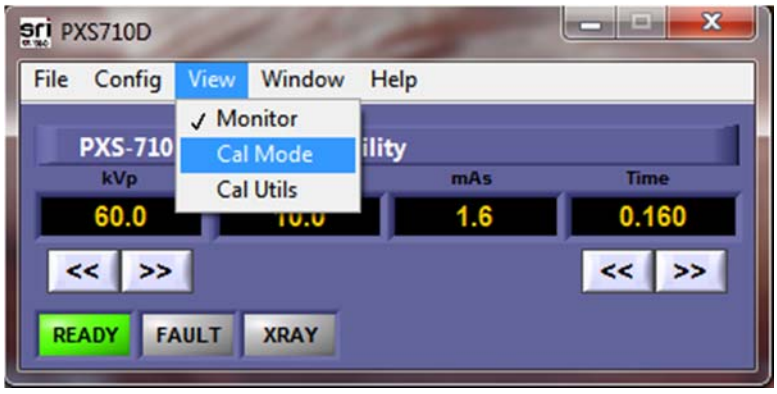


Figure 2.9
Calibration Mode Selection

c. Cal Mode adds addition diagnostic information to the application window. Ref fig. 2.10. This information is shown once the **PREP** switch on the Exposure switch is depressed.

1) Firmware revision

2) Controller state

3) Firmware CRC

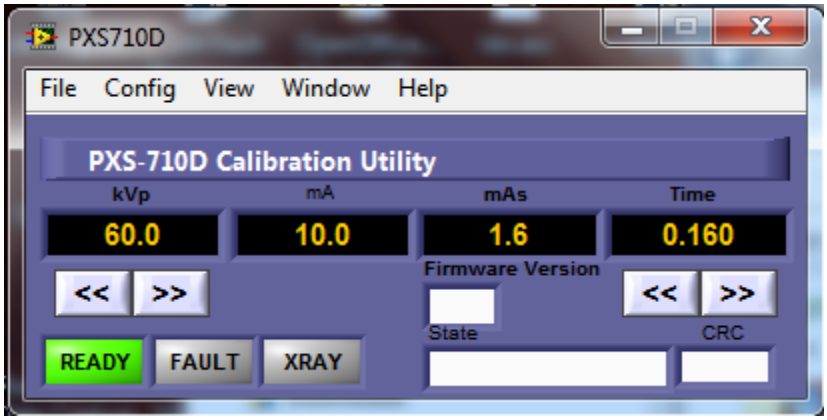


Figure 2.10
Calibration Mode

d. kVp adjustment is accomplished by the **UP** and **DOWN** buttons located under the kVp display.

e. Time/mAs adjustment is accomplished by the **UP** and **DOWN** buttons located under the Time Display.

f. To Prepare the Generator, press the Exposure switch's **PREP** button. A 2 second PREP display will be shown and turn **GREEN** when the unit is ready to Expose. Ref Fig. 2.11

Figure 2.11
Ready Indicator

g. To Make an X-Ray Exposure in the Cal Mode, press the **EXPOSE** button on the Exposure switch. Hold for the length of the exposure. Once the Exposure ends, release both the **PREP** and **EXPOSE** buttons on the Exposure switch.

   An Exposure indicator will be displayed for the duration of the exposure. Ref fig 2.12. A XRAY indicator is present on the main application window as well.

Figure 2.12
X-ray Indicator

h. When the '**Cal Mode**' is no longer required, Select '**File->Exit**' from the drop down menu.

2.6 mAs

Measure the mAs using the mAs meter and confirm accuracy as indicated on checklist.

2.7 BEAM ALIGNMENT

Tighten yoke block to prevent movement during alignment. Rotate Collimator so that the knobs are facing front and tighten lock. Remove the collimator outer shroud by removing the 4 screws securing the shroud to the collimator. Place the phosphor screen in the beam at 30.6" and collimate field just to the outside edge of the middle 5" x 7" rectangle. Place Beam Alignment Tool in center of field (center dot at intersection of center lines) and adjust beam so that shadow of upper dot covers lower dot. Readjust borders if necessary.

Set the Control Module to 70kV, 20.0 mAs. Take an exposure while observing the X-Ray field through the lead glass window of the test cabinet. Note the difference observed between the light field and the X-Ray field for further adjustment.

If the centers are too far out of alignment, adjustment of Collimator light field is necessary. To adjust the horizontal position of the light field, rotate the unit 180 degrees to gain access to the mirror adjustment hardware. Loosen the locking screws sufficiently so as to allow the turning of the adjuster cam. Lock the fixing screw and cam after adjusting the mirror position. To adjust the vertical position of the light field, remove the lamp heat dissipater taking care to avoid being burned, as the dissipater can be very hot. Loosen the two lamp support fixing screws and using the hexagonal screw on the side of the lamp, adjust the lamp in the desired direction. Tighten the four screws fixing the lamp support.

Finally, to adjust the brightness at the edges of the light field, loosen the screws fixing the screen to the lamp holder, and using an Allen screws, move the screen to obtain the desired adjustment. Tighten the screen fixing screws.

UNIT OPERATION

3.1 CONTROLS AND INDICATORS

DESCRIPTION	FUNCTION
1) POWER ON SWITCH	Rocker type switch that controls the CIRCUIT BREAKER primary power into the system. Operating the switch turns the unit on. Power should not be turned on until the generator is ready for use. Circuit breaker will trip if excess current is drawn.
2) A.C. INPUT CONNECTOR	Connects Control/Generator Assembly to supply mains.
3) EXPOSURE SWITCH CONN	Connects the exposure switch to the Control/Generator Assembly.
4) MA TEST JACK	Test point for mA during the calibration mode.
5) CONTROL CONNECTOR	Connects to the optional Wall Mount Control Module.
6) RS-232 CONNECTOR	RS-232 Communications for Remote Host Control via OpalRad or other control program.
7) kVp METER	A digital LED meter that indicates the kVp prior to exposure.
8) MAS METER	A digital LED meter that indicates the computed MAS prior to exposure.
9) KVP ADJUST	Two momentary switches that adjust the kVp from 40 to 80 kVp in 1 kVp increments.
10) MAS ADJUST	Two momentary switches that adjust the MAS up or down from 0.1 to 30 mAs.

11) READY INDICATOR	Color GREEN per 60601-1 3rd Ed. Illuminates when unit is ready foroperation. Automatically prevents excessive operation by means of a time delay circuit.
12) X-RAY ON INDICATOR	Color YELLOW per 60601-1 3rd Ed. Illuminates when exposure switch is depressed to indicate that x-ray's are being produced for the pre-set time interval. In addition, an audio tone is generated at the same time.
13) FAULT INDICATOR	Color RED per 60601-1 3rd Ed. A lamp that illuminates to indicate that a fault condition has occurred. Refer to table 5.2 for a description of fault conditions.
14) RESET BUTTON	Clears and resets the front panel controls in the event of a fault condition (reference Table 5.2)
15) ANGLE INDICATOR	A Angle indicator for the Horizontal Axis of the Generator position.
16) HAND SWITCH	A two-position switch that controls the x-ray output. The first position is for prep (ready) light goes out and comes back on when unit is prepped), the second position is for x-ray (x-ray light comes on while x-rays are being produced). Premature release of the exposure switch will terminate the exposure and light the fault lamp. Depress the **RESET** button to clear the fault and Reset the timer.

NOTE: Internal fuses provide protection for auxiliary DC circuits; replacements should be made by Authorized Source-Ray Personnel only.

3.1 Continued:

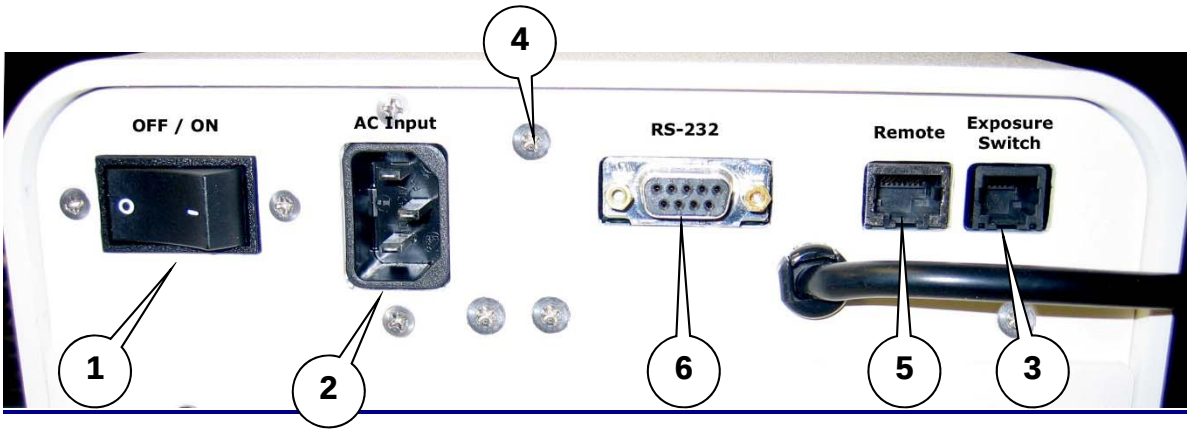


Figure 3.1
Generator/Control Connector Descriptions
(Generator Bottom View)

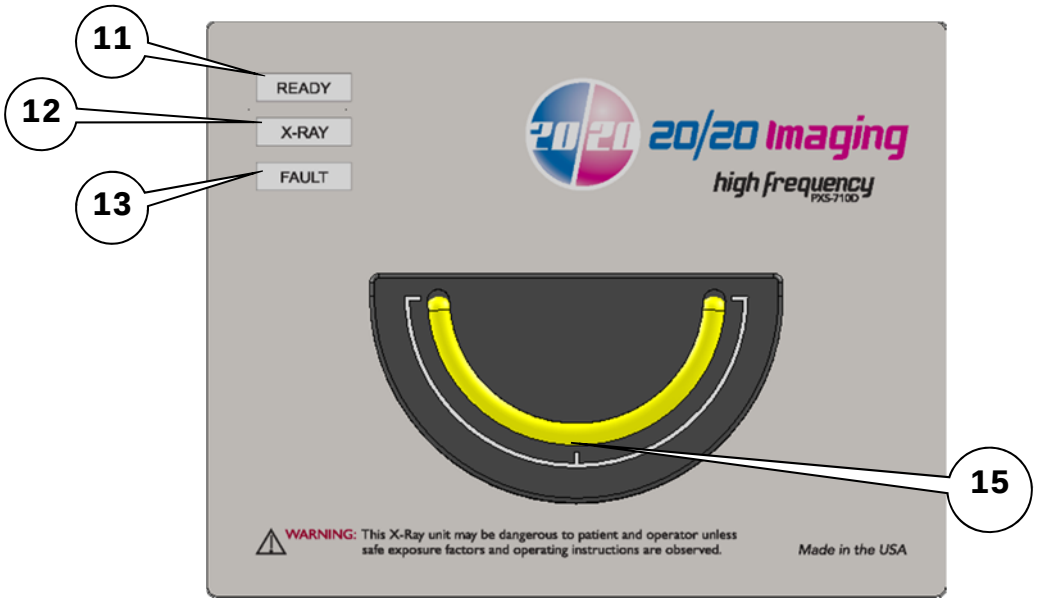


Figure 3.2
Control Panel Descriptions

3.1 Continued:

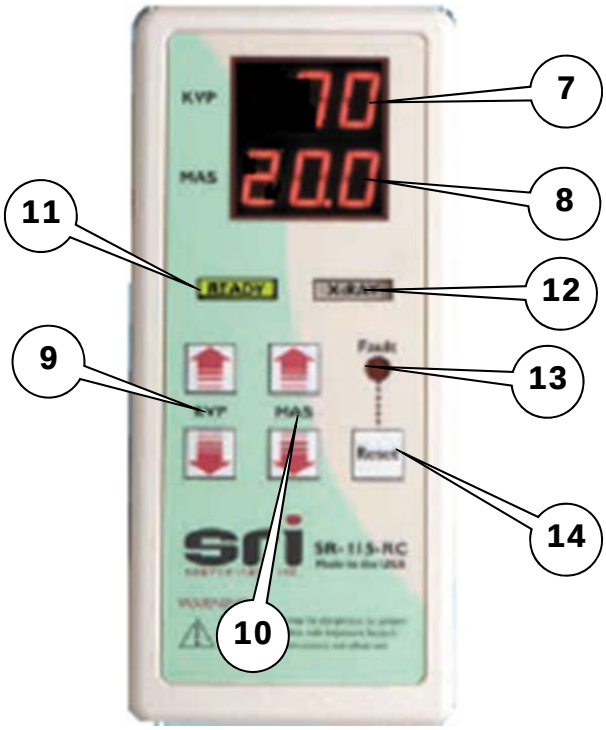


Figure 3.3
Optional Remote Control Panel Descriptions

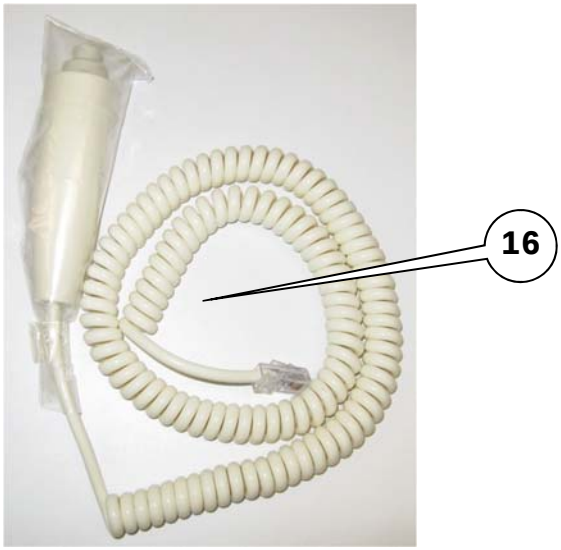


Figure 3.4

Hand Switch Assembly

3.2 System Base

DESCRIPTION	FUNCTION
A) BOOM ARM	Controls the angle adjustment of the Generator/Control Assembly.
B) SHUTTER KNOBS	Adjusts X-Ray field size.
C) PATIENT SUPPORT RAIL	Functions as a support point for patients.
D) PATIENT BASE	Functions as positioning area for patient.
E) DETECTOR SLOT	Functions as a positioning slot for the 20/20 imaging detector. One is provided for Vertical alignment. Another is provided for Horizontal alignment.
F) COLLIMATOR LAMP	Left and Right buttons are provided on the Collimator. Depressing any button activates/de-activates the lamp, which is automatically extinguished after approximately 20 seconds to extend bulb life.
G) SLIDE HANDLE	Slide Handle for Opening and Closing the Vertical DETECTOR SLOT.

3.2 Continued:

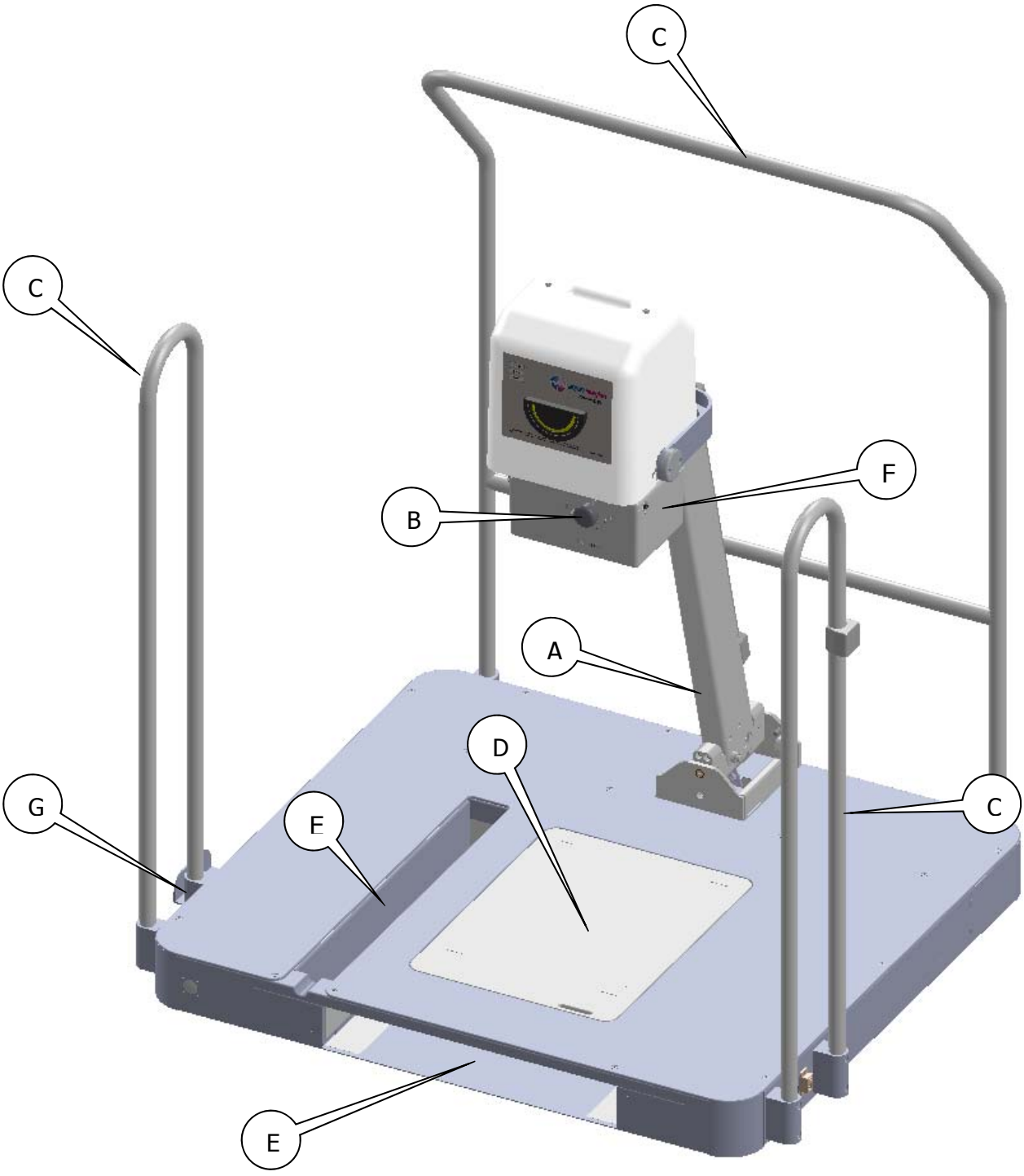


Figure 3.5

System (Front View)

3.2 Continued:

DESCRIPTION	FUNCTION
H) PANEL POWER SWITCH	Power Switch for the Imaging Panel Power Supply.
J) RS-232 CONNECTOR	Pass-Thru connector for the RS-232 port for Generator control by a Host Application. Provides connection to the Control/Generator RS-232 Port. DB9 FEMALE
K) REMOTE CONNECTOR	Pass-Thru Connector for the Optional Remote Control RC-115. Provides connection to the Generator/Control's Remote port. RJ45
L) USB	Pass-Thru USB A-B Connector for the 20/20 Imaging Panel. Provides a USB 'B' type connector for connection to the 20/20 imaging panel.
M) POWER CONNECTOR	IEC C14 Style AC Power Input Connector.
N) GENERATOR CABLE	Fixed cables. Generator/Control cables.
P) 20/20 IMAGING PANEL P/T	Pass-Thru Cable Grommet for the 20/20 Imaging Panel cable assembly.
R) EXPOSURE SWITCH	Exposure Switch Pass-thru Connector. Connects to the Generator/Control's Exposure switch connector. RJ12

3.2 Continued:

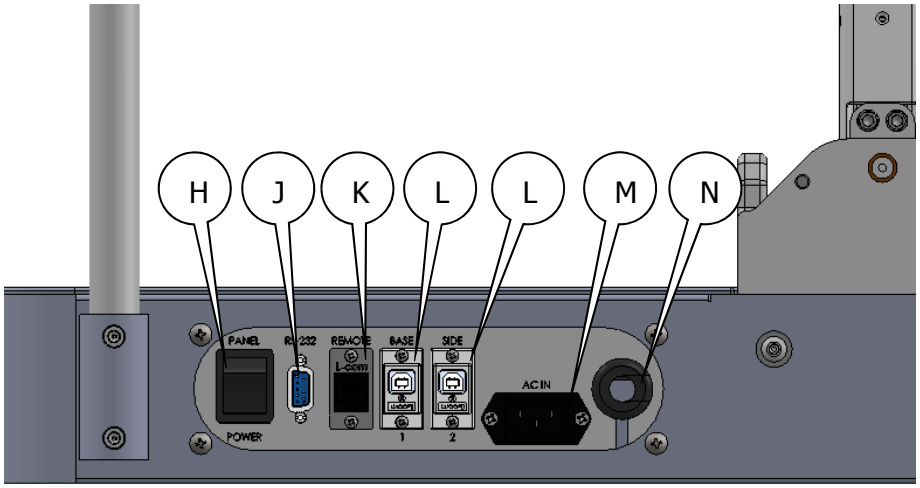


Figure 3.6

System Base (Rear Connector Panel)

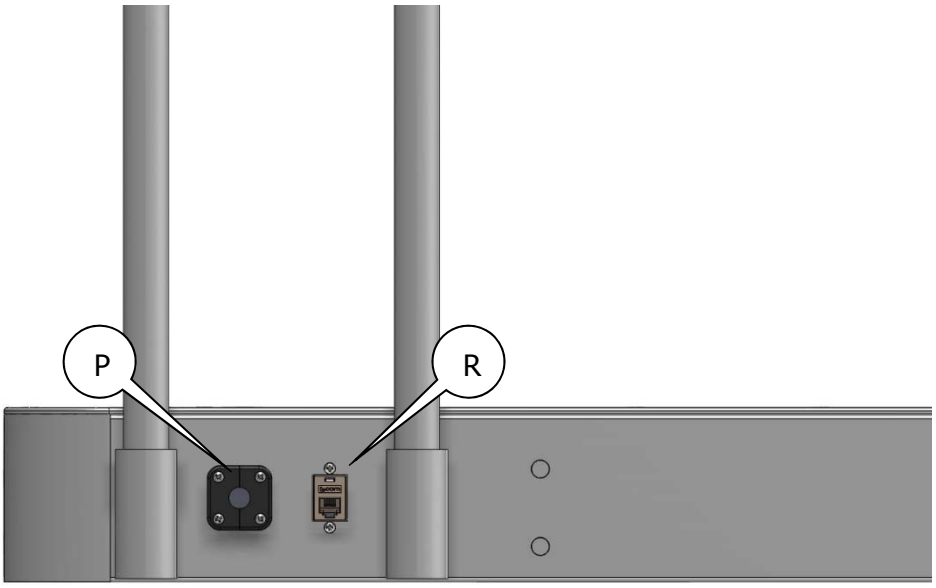


Figure 3.7

System Base (Side Connector Panel)

3.3 OPERATING PROCEDURES: Generator/Control Assembly

CAUTION

Do not attempt to connect or disconnect any interconnect cables Without disconnecting the mains supply first.

3.3.1 Manual Operation Optional RC-115

1) Operate the "Power On" switch (1) to turn the primary power on.
2) Activate the "**Collimator Lamp"** (G) by depressing one of the push-buttons located on the left or right side of the collimator. The collimator lamp will automatically extinguish after a period of approximately 15-30 seconds to extend bulb life.
3) Collimate the light field to the area of interest by means of the shutter adjust knobs.
4) Manually select the desired kVp by means of the kVp adjust switches on the optional Remote Control RC-115 (9).
5) Adjust the **"mAs"** to the desired interval by means of the mAs selectors (10). The resultant mAs is displayed on the mAs meter (8). Reference Table 3.1 for standard techniques.
6) After the required warm up period, the **"Ready"** Indicator will illuminate. It will not be possible to operate the unit until this has occurred. If the unit has not been operated for a long period of time an additional 2-minute waiting period is recommended.
7) While holding the **"Remote Exposure Control",** step at least 6 feet to side of side of the x-ray control/generator assembly.
8) Depress the **"X-Ray Switch"** to the first position (prep). The **"Ready Light"** will go off and come back on when the unit is fully prepped.

3.3 Continued:

9) Depress the **"X-Ray Switch"** to the second position for immediate exposure. An audio tone will sound in addition to the "**X-Ray"** indicator illuminating for the duration of the exposure. Releasing the **"X-Ray"** switch prior to the pre-selected interval will terminate the exposure, light the **"FAULT"** Indicator and display a fault condition (Ref. Table 5.2).

NOTES:

1) Unless the x-ray generator is going to be immediately used again, the "Power ON" switch should be turned off. Leaving the unit turned on provides opportunity for an accidental operation.

2) If the unit is going to be operated again, an automatic inhibit circuit will allow the x-ray tube to cool in proportion to the exposure time to prevent damage to the x-ray tube from overheating. At the end of this cycle the **"Ready"** light will illuminate indicating an exposure can be made.

3.3.2 Integrated Operation (3rd party OpalRad Software)

The Generator/Control can be integrated with 3rd party applications to provide Anatomical programming of the Generator techniques. OpalRad by Viztek is available to control the PXS-710D. Please reference the OpalRad user Manual for more information.

1) Open and Run the OpalRad study list application.
2) Login, with your credentials provided by your Administrator.
3) The StudyList displays a list of patients, both past studies and waiting studies are shown in the list. Please reference the OpalRad user Manual for more information on the Study list and its configuration. Ref Fig 3.7

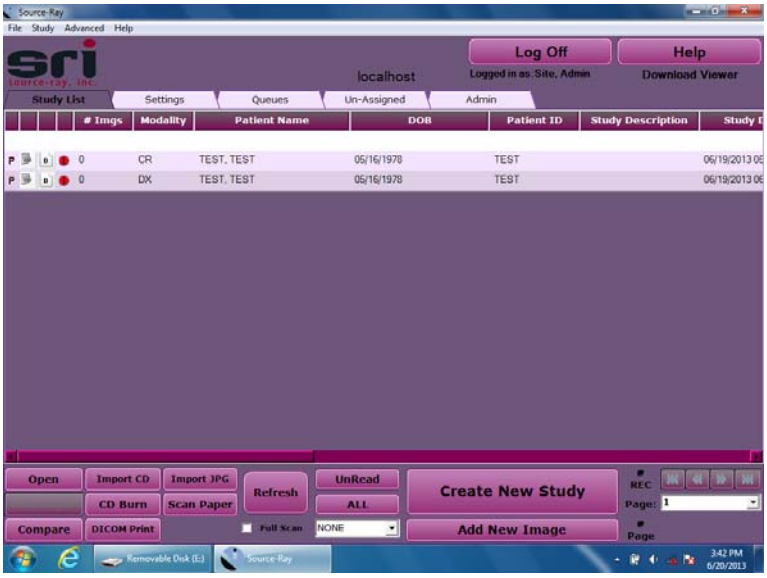


Fig 3.8

OpalRad Study List

4) If there are no patients in the study list, click on "Create New Study".

5) Enter Patient information in the New Study dialog. Ref Fig 3.8

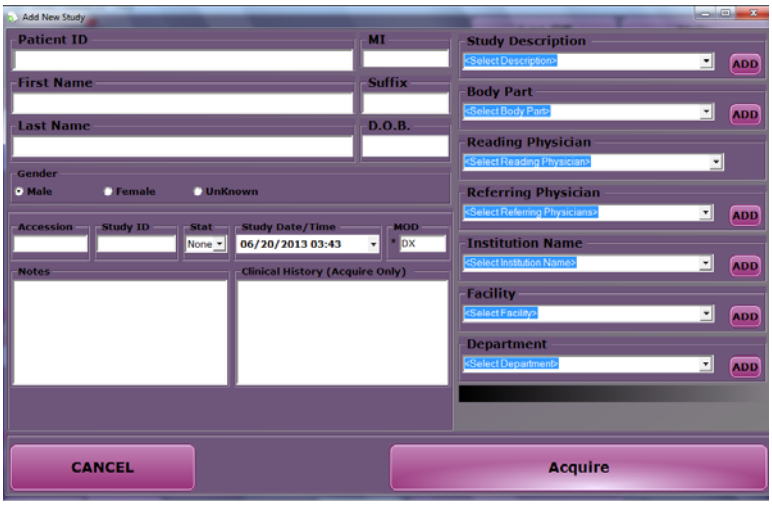


Fig 3.9

OpalRad Patient Entry

6) Click on "Acquire" to Open the Image Acquisition interface, OpalUAI. Ref Fig 3.9

Fig 3.10

OpalRad Acquisition Screen

7) Alternatively if patients are present in the study list, Select a patient from the list.
8) Click on the "Add New Image" button at the bottom of the screen.
9) In the OpalUAI, if a Study had been selected, the anatomical body part will have been selected. Skip to…#14.
10) If a New study was created, without a body part association. A body part should be selected. Select 'Right' or 'Left' from the family group.
11) Select a 'View' from the Region group. Eg; Foot
12) Select a 'Part' from the Part group. Eg; 'Foot AP'
13) Once a Part is selected the Generator technique is set with the technique associated with the Body Part.

14) The kVp selector shows the Currently selected kVp and the Generator kVp. Ref Fig 3.10

Fig 3.11

OpalRad Generator Controls

15) The mA selector shows the Currently selected mA and the Generator mA. (The PXS-710D only has one setting of 10ma)
16) The mAs selector shows the currently selected mAs and the Generator mAs.
17) The Time selector shows the currently selected Time and the Generator Time.
18) When any Technique is changed, the new technique is displayed in a Red color until the Generator has been updated, at which point it will be displayed in White. Ref Fig. 3.11 & 3.12

Fig 3.12

OpalRad Kvp Change

Fig 3.13

OpalRad MAs Change

19) To Change the kVp Technique. In the kVp display, Click on the top arrow to increase the setting, Or Click on the Bottom arrow to decrease the technique.
20) To Change the mAs Technique. In the mAs display Click on the top arrow to increase the setting, Or Click on the Bottom arrow to decrease the technique.
21) To Change the Time Technique. In the Time display Click on the top arrow to increase the setting, Or Click on the Bottom arrow to decrease the technique.
22) When the Set Technique matches the Generator Technique, the On Screen Generator Controls will resemble Fig 3.10
23) Techniques may be changed before the Exposure, When a technique is changed the Set techniques will display Red until the Generator Syncs with the Opal UAI. This normally takes approximately 1 second. Ref Fig 3.11 and 3.12
24) To take an Exposure, press the two Position Exposure Switch to position 1, the 'PREP' position. The OpalUAI will Show a Prepare indicator, then after 2 Seconds show a Green Radiation Symbol to indicate that a Exposure can be taken. Ref Fig. 3.13

Fig 3.14

OpalRad Ready Indicator

25) To make an Exposure press the exposure switch to the second position 'XRAY' and hold for the length of the exposure. The OPALUAI radiation indicator will turn YELLOW to indicate an Exposure. Ref Fig 3.14 Once the exposure terminates, release the two stage exposure switch.

Fig 3.15

OpalRad X-Ray Indicator

26) The OPALUAI will then Acquire and process the image from the digital detector. Please Refer to the OpalRad user Manual for more information.

27) The PXS-710D Generator requires a Ready wait time before another exposure can be made. The OPALUAI displays this time in a Gray/Red bargraph. Ref. Fig 3.15

Fig 3.16

OpalRad Ready Time Display

28) Once the image is acquired, either Accept or Reject the image.
29) Once Imaging is completed, Click on the 'EXIT' button to Exit the OPALUAI and return back to the Study List. Ref Fig 3.7

3.4 Faults:

The PXS-710D, when it encounters a Fault condition, will alert the user.
There are three ways a unit Fault may be displayed to the User.

1) Fault Indicator on Generator/Control Panel.
2) Fault Indicator on optional Remote Control RC-115. A Fault Code is also Displayed in the kVp display to indicate the fault. Ref Fig 3.3 & Table 5.2
3) Fault Reporting via the RS-232 Host Control interface. Please reference the PXS-710D Control interface documentation.

All Faults may be Reset by Cycling AC Power to the Unit.
For Item #2, The Optional Remote Control Provides a 'RESET' button.
For Item #3, a Command may be sent from the Host to reset the PXS-710D.

3.5 OPERATING PROCEDURE: Podiatry Support Base

1) Move the Boom Arm (A) to the desired position and release, the Boom Arm will retain the current position. The Boom Arm position range Left to Right is from -45° to 90°. Front and back position range is -2° to +15°
2) To change the angle of the Generator/Control Assembly, Rotate the Generator/Control Left 15° or Right 15°, Detents will hold the Generator/Control in -15°, 0, +15° increments.
3) To change the forward tilt of the Generator/Control Assembly, push the top of the generator back to move the X-Ray field forward. Detents are provided at 0° and 15°.
4) To Place the Detector in the Vertical Detector slot, Pull on Slide Handle (G) to open Detector Slot, and insert Detector. Remove Detector and Push on Slide handle (G) to Close Detector Slot.

TABLE 3.1
TECHNIQUE CHART

XM3 PDR (Naomi): 400 speed.

Examination	Thickness	KVP	MAS	SID	Notes
Foot					
Dorso-plantar (AP)	Normal	55 -60	1.5	30″	
Lateral	Normal	55 -60	1.5	36″	
Marked Lesion	Normal	55 -60	1.5	30″	
Lateral Oblique	Normal	55 -60	1.5	36″	
Medial Oblique	Normal	55 -60	1.5	30″	
Axial Calcaneal	Normal	55 -60	4.5	30″	
Axial Sesamoid	Normal	55 -60	4.5	30″	
Harris and Beath	Normal	55 -60	4.5	30″	
Lewis	Normal	55 -60	3.0	30″	
Causton	Normal	55 -60	3.0	30″	
Ankle					
Anterior-Posterior	Normal	55 -60	3.0	30″	
Lateral	Normal	55 -60	3.0	36″	
Lateral Oblique	Normal	55 -60	3.0	36″	
Medial Oblique	Normal	55 -60	3.0	30″	
Mortise	Normal	55 -60	3.0	30″	
Stress Views (AP, lat)	Normal	55 -60	1.5	30″/36″	
Holly	Normal	55 -60	1.5	36″	
Isherwood	Normal	55 -60	1.5	36″	
Broden	Normal	55 -60	3.0	36″	

CR (Generic): 150 speed.

Examination	Thickness	KVP	MAS	SID	Notes
Foot					
Dorso-plantar (AP)	Normal	55 -60	5.5	30″	
Lateral	Normal	55 -60	5.5	36″	
Marked Lesion	Normal	55 -60	5.5	30″	
Lateral Oblique	Normal	55 -60	5.5	36″	
Medial Oblique	Normal	55 -60	5.5	30″	
Axial Calcaneal	Normal	55 -60	5.5	30″	
Axial Sesamoid	Normal	55 -60	5.5	30″	
Harris and Beath	Normal	55 -60	5.5	30″	
Lewis	Normal	55 -60	5.5	30″	
Causton	Normal	55 -60	5.5	30″	
Ankle					
Anterior-Posterior	Normal	55 -60	5.5	30″	
Lateral	Normal	55 -60	5.5	36″	
Lateral Oblique	Normal	55 -60	5.5	36″	
Medial Oblique	Normal	55 -60	5.5	30″	
Mortise	Normal	55 -60	5.5	30″	
Stress Views (AP, lat)	Normal	55 -60	3.0	30″/36″	
Holly	Normal	55 -60	3.0	30″	
Isherwood	Normal	55 -60	3.0	30″	
Broden	Normal	55 -60	3.0	30″	

Harris
Axial projection of the heel is useful for demonstrating talo-calcaneal bars. Patient stands with both feet on the film. The patient leans forward slightly. The tube is positioned behind the patient and the central ray is angled 45 degrees towards the heels and is centered between the medial malleolus.

Lewis Method
The routine view of the Sesamoid bones of the first metatarsal.

Isherwood Methods (subtalar region)
1) Projection to demonstrate the anterior subtalar articulation. Medial border of the foot at a 45-degree angle to the cassette. Center 2.5cm distal and 2.5cm anterior to the lateral malleolus.
2) Projection to demonstrate the middle articulation of the subtalar joint and give an end-on view of the sinus tarsi. Foot in the AP ankle position, rotate the ankle 30 degrees medially. Center to a point 2.5cm distal and 2.5cm anterior to the lateral malleolus with a 10 degree cephalad angulation.
3) Projection to demonstrate the posterior articulation of the subtalar joint in profile. Foot in the AP ankle position. Rotate the ankle 30 degrees laterally. Center to a point 2.5cm distal to the medial malleolus with a 10-degree cephalad angulation.
4)

Broden I
Subtalar joint view. Foot positioned as for AP ankle, then rotate the foot 45 degrees medially. Angled the tube cranially between 10 degrees and 40 degrees.

Broden II
Subtalar joint view. Foot positioned as for AP ankle, then rotate the foot 45 degrees externally. Angle the tube cranially 15 degrees.

Causton Method
Oblique foot projection to demonstrate the sesamoids. Position foot laterally, with the medial side against the cassette. Angle the central ray 40 degrees towards the ankle and center to the first metatarsophalangeal sesamoids.

THEORY OF OPERATION

4.1 SYSTEM OVERVIEW

The Model PXS-710D incorporates one major electrical assembly, the Control/Generator Assembly. The Control/Generator Assy. consists of five sub-assemblies. The generator assembly houses the high voltage circuitry and the x-ray tube, high frequency generating circuitry, control electronics, microprocessor and a collimator (beam limiting device) assembly.

The PXS-710D also can be controlled via a RS-232 Serial link, the RS-232 Serial link allows a 3rd party computer application, OpalRad, to communicate with the generator.

4.2. GENERATOR/Control ASSEMBLY

The Generator Assembly is made up of High Voltage multipliers for the anode and cathode supplies, voltage feedback dividers, high voltage transformers and the filament transformer. For the Low Voltage section a Control Microprocessor PWA, Power Board PWA and the 24V power Supply are used.

The voltage used to generate the high voltage enters the assembly at pins **1 & 7** of connector P1. The voltage is approximately 650 VPP at an approximate 30 kHz square wave, for a 70-kVp output.

The filament voltage enters at pins **2, 4 & 6** of connector P1. Pin 4 is at a DC level of approximately 24V, and pins **2 & 6** have a high frequency voltage of about 48 VPP at approximately 50 KHz with respect to ground. Pin **3 & 5** of **P1** are ground connections.

Pin 9 of **P1** is the kV feedback signal (10 V=100kV). Pin **10** of **P1** is the cathode low-end signal **(10V = 10mA).** Pins **11** of **P1** provides the anode low-end signal, which goes to the mA test jack.

Connector **J3** (mA test jack) places a mA meter in series with the mA line for calibration purposes (Ref. Section 2.3).

4.2 Continued:

The Power Board Inverter Assembly is powered by 115 VAC or 230 VAC via connector **TB1** (ref dwg. 100206). With circuit breaker **CB1** closed, an AC voltage is applied through current limiting resistor **R1** of the Power Board PWA. The voltage is then rectified and filtered via Diode Bridge **D1** and Capacitors **C1 – C2**. The DC Voltage is used as the "Rail Voltage" for the High Frequency Drive to the X-Ray Generator.

Relay **K1**, contacts **1A** and **1B** short resistor **R1,** on the Power Board PWA, during the **Prep** and **X-ray** period to allow the line to deliver the required power. Transistors **Q1** and **Q2** of the Control/Generator Assembly make up a full bridge high frequency circuit operating at approximately 30 kHz. This circuit is energized during the X-Ray On period and is used to convert the DC voltage back to high frequency AC to drive the high voltage transformer in the generator assembly (approx. 30 kHz).

The Control Board PWA provides commands to the Power Board PWA electronics for the kV reference, filament pre-heat, exposure time… and monitors the system for faults.

U15 of the Control Board PWA provides the High Frequency Drive for the High Voltage Supplies (anode & cathode), it drives the pulse transformer **T1** through signal FET's **Q4 & Q6**. Transformer **T1** drives the Gate of the IGBT's, **Q1 & Q2** located in the Power Board Assy.

U16 of the Control Board Assy. supplies the High Frequency Drive for the filament circuitry by driving FET's **Q8 & Q9** on the Power Board PWA. These FET's provide the High Frequency voltage for the filament transformer **T1** of the Generator Assy. Current transformer **T4** of the Power Board PWA monitors the primary current to the High Voltage Transformers and triggers timer **IC/U13** which sends a fault to the Microprocessor and shuts down the High Frequency Generator **IC/U15** which in turn shuts down the High voltage IC's.

4.2 Continued:

IC/U18A (Over Voltage Comparator) and **IC/U17A & U18** (Over Current Comparator) shut the High Voltage down in the event of an over-voltage or over-current condition. A fault signal is also sent to the Microprocessor.

IC/U19 is the DC-DC converter that converts the 24VDC to +/-15VDC for the low voltage signal processing electronics.

Power Supply **A1** on the Power/Control Assy. provides the +24VDC for all electronic and microprocessor circuitry.

4.3 OpalRad Rs-232 Interface

The RS-232 Serial Link allows a 3rd party application to control the Generator. Generator settings such as kVp, mAs can be set by the 3rd party application.

The complete protocol is available from Source-Ray Inc. upon request.

The following applications have been validated to operate with the PXS-710D:

Manufacturer	Product	UAI Version
Viztek	OpalRad	2.3.4.24

Table 4.3, Approved 3rd Party Control Software

The Serial hardware in the PXS-710D generator uses a 2.5KV Optically Isolated EIA/TIA-232E Compatible 3-wire interface. (Ref Figure 3.1 Item 6) This interface Operates at 19200 BAUD, 8N1. The Pin assignments are listed in Table 4.4

Pin #	Function Description	Signal
1	N/C	
2	TX	Output
3	RX	Input
4	N/C	
5	GND	Common
6	N/C	
7	N/C	
8	N/C	
9	N/C	

Table 4.4, RS-232 Pin Out

The Serial Protocol used in this interface incorporates a data packet with a 16bit CRC for error detection. Handshaking ACK and NAK replies are incorporated to enable error recovery.

The Interaction of the OpalRad UAI (User Acquisition Interface) with the PXS-710D Generator is as follows: (ref. Figure 4.3)

The OpalRad UAI will be referred to as the 'Host'

Generator Idle

When the generator is at rest, three (3) commands are recognized from the Host:

SETGENCMD	Sets the Generator Techniques
UNSETGENCMD	Revokes the Generator Techniques
ERRORSTATUSCMD	Requests the current machine status

The SETGENCMD sets the Generator Techniques with the Data supplied in the data packet. When a user picks a technique button, this command is sent to the generator.

The UNSETGENCMD revokes any set techniques by setting them to zero. This is sent to the generator when a Technique button is de-selected.

The ERRORSTATUSCMD Request is used for retrieving the Generator Techniques and obtaining Error information. It is also used to verify the Generator is properly connected and powered ON.
The OpalRad UAI will process any Errors returned and display them to the User. These Errors are outlined in Table 5.2

Generator PREP

If the generator enters the PREP state the following command is sent to the Host:

PREGENCMD	Indicates to the Host the PREP switch is activated.

When the User depresses the PREP switch, the generator sends a PREGENCMD to the Host. This will alert the Host that the User is attempting to start the expose process. The Host will then Display a READY Icon to alert the User that a 2 second x-ray Tube filament heating time is in progress. After 2 seconds the Icon turns GREEN, indicating to the user that an exposure can be made.
During the PREP and the following XRAY state, the Generator will not accept any commands and the set Techniques cannot be changed.

Generator XRAY

During the Exposure process the following commands are sent to the Host:

XRAYINDCMD	Indicates to the Host a X-Ray indicator is to be displayed.
POSTGENCMD	Indicates to the Host an exposure has completed.

Generator XRAY (Continued)

When the User proceeds to depress the XRAY switch the generator sends a XRAYINDCMD to the Host. The Host then displays a X-RAY Icon to indicate to the User an exposure is in progress.

The Generator will then make an exposure with the Techniques set in the Generator Idle state.
If an Error Occurs or the User releases the PREP and/or XRAY switches the Exposure terminates.
Otherwise the Exposure completes normally with the Techniques that were set.

Once the Exposure is completed, a POSTGENCMD is sent to the Host. The POSTGENCMD contains the Techniques used for the exposure including Time. If the exposure terminated prematurely, the POSTGENCMD reports the actual exposure time and returns the Error that caused the termination.
After the Exposure and when the User has released the PREP and XRAY switches, the Generator returns to the Generator Idle State.

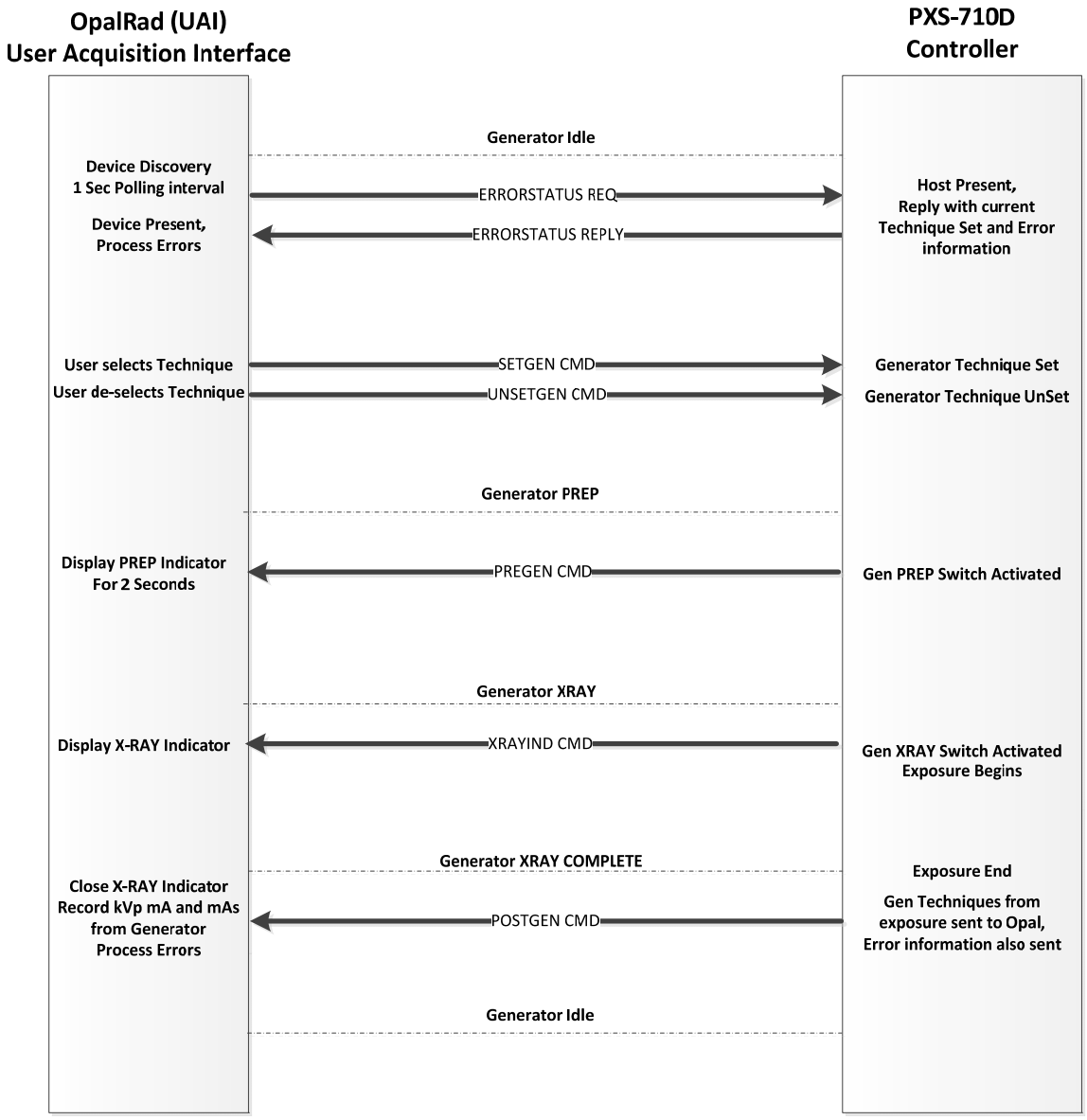


Figure 4.3, Generator OpalRad Communications

UNIT MAINTENANCE

CAUTION

This Section Pertains To Authorized Source-Ray Service Personnel Only

5.1 INTRODUCTION

In order to keep the Source-Ray unit operating properly, it must be inspected and checked in accordance with the recommended intervals depending on the age and use of the equipment. If there is a problem, call an authorized serviceman. DO NOT OPERATE THE EQUIPMENT UNTIL REPAIRS ARE COMPLETED.

5.2 RECOMMENDED INTERVALS

Periodic preventive maintenance including cleaning, mechanical and electrical adjustments, are to be performed every **Six months** or 3000 exposures. The periodic maintenance schedule is required to maintain the unit in proper and accurate working condition.

5.3 ORDERING INFORMATION

To order replacement parts contact your local authorized Source-Ray dealer. Authorized Source-Ray dealers should contact the main office at (631) 244-8200 between the hours of 8:00 AM and 5:00 PM. When ordering replacement parts be prepared to submit the following information: purchase order no. (If possible), Source-Ray part number, part description, quantity required and shipping instructions. If replacement parts are for a unit under warranty be prepared to submit model numbers and serial numbers to expedite your order.

5.4 MAINTENANCE PROCEDURE

Cleaning Procedure

- When cleaning, use a cloth moistened in warm soapy water (use mild soap).
- **Do not** soak the unit and **do not** use strong cleaners or solvents as they may blur the lettering or dull the finish.
- Polish with pure liquid or paste wax only.
- Do not use a wax containing a cleaning substance.
- Do not polish the meter windows.

Disinfecting Procedure

- X-ray equipment and accessories should be properly disinfected immediately after use and before the next patient is attended to.
- A diluted solution of sodium hypochlorite should be routinely used for disinfecting x-ray equipment and accessories, especially those without stainless steel components.
- Radiographers should wash their hands after attending to a patient and before attending to the next patient.

TABLE 5.1
MAINTENANCE CHECKLIST

MODEL: PXS-710D **SERIAL #** _____

1) Beam Current (Reference Section 2.3) _____
2) Tube Potential (Reference Section 2.4). _____
3) MAS (Reference Section 2.5). _____
4) Beam Alignment (Reference Section 2.6) _____
5) Check voltage on X-Ray Generator at J2 pins A and B (collimator supply) with collimator unplugged (24 VDC). _____
6) Check that all Indicator lights are operating. _____
7) Check that all hardware is tightly secured. _____
8) Check that collimator-mounting ring is tight. _____
9) Check all interconnect cables for broken or frayed wires. _____
10) Check that all hardware is secure and properly fastened. _____
11) Check that all friction locks (head rotation) are properly adjusted, tighten as required. _____
12) Inspect piston mounts. Make sure all mounting hardware is secure. (tighten if necessary) _____
13 Inspect piston strength, if unit drifts down when lock is not engaged, replace piston. _____

Comments:

_____

_____

_____

_____

SERVICE ENGINEER: _____ **DATE**: _____

TABLE 5.2
DISPLAYED FAULT CONDITIONS

DISPLAY	FAULT DESCRIPTION	ACTION REQUIRED
1	Inverter Fault.	Reset Unit (1), Call for Service
2	No or low mA signal during exposure	Call for Service
3	Exposure terminated by operator	Reset unit
4	Stuck or shorted exposure switch.	Check or replace switch.
5	Reserved	
6	Reserved	
7	Reserved	
8	Exposure watchdog failure	Call for Service
9	Flash CRC Error	Call for Service
10	RAM Memory Error	Call for Service
11	EEPROM CRC Error	Call for Service
12	EEPROM Write Error	Call for Service
13	Serial Communications Error	Reset unit
14	Stuck or Shorted Prep Switch	Check or replace switch.

NOTES:

1) May indicate a timer problem. Depress the reset button to clear the fault condition and continue. If the problem persists, call for service.

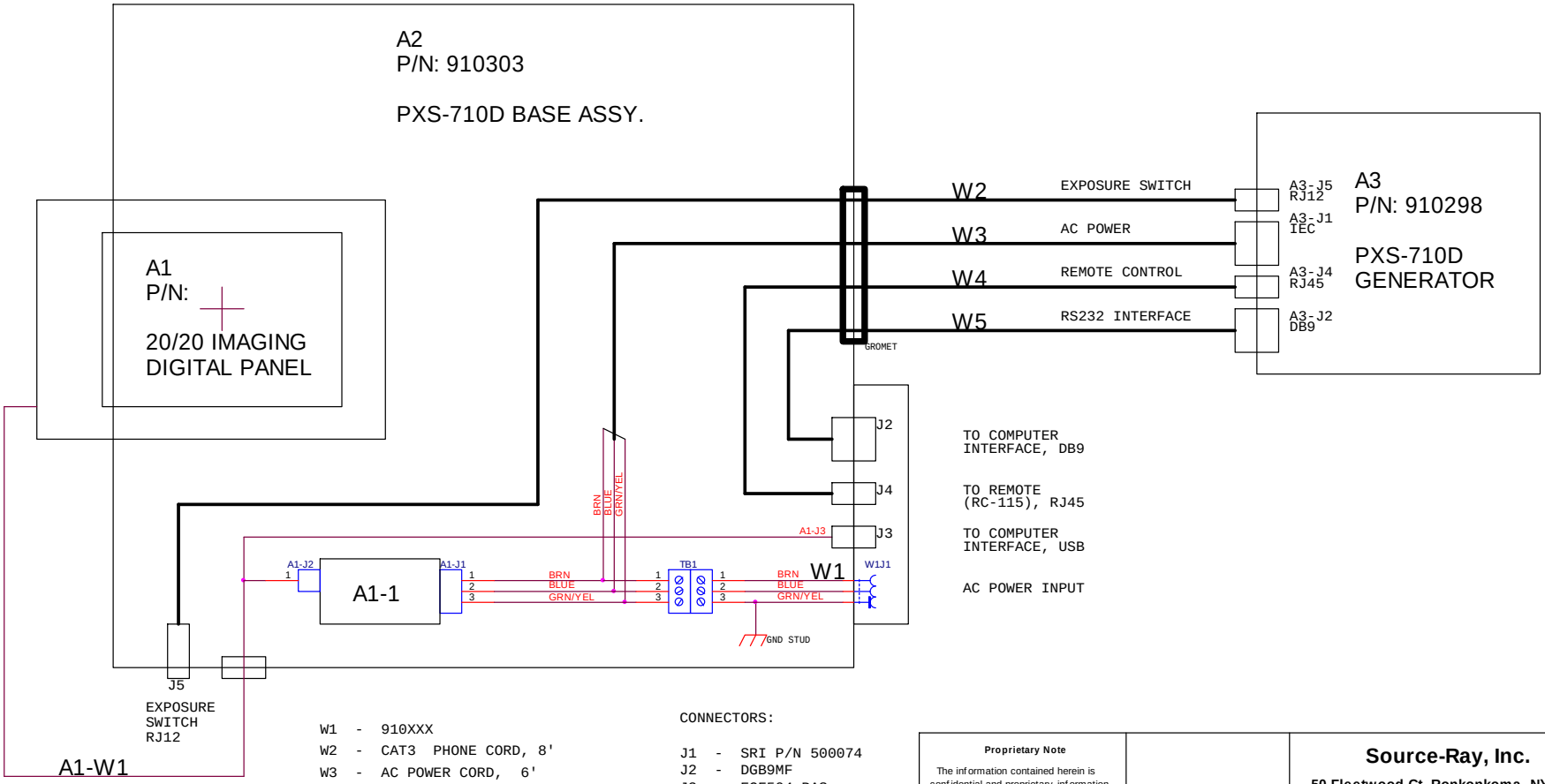
TABLE 5.3

Warranty Statement

WARRANTY

Source-Ray, Inc. warrants its Model PXS-710D Podiatry X-Ray System to be free of manufacturing defects, which can impair their normal operation when used within their specified ratings. Claims under this warranty must be made within 3 years after shipment from the factory. Such warranty shall not apply to defects resulting from accidents, alterations, abuse or misuse. Liability under this warranty is limited to repair or replacement of defective components at the factory. ***Shipping costs are not included.*** This warranty is in lieu of any other warranty expressed or implied. Collimator bulbs, exposure cord assemblies, interconnect cables and tires are considered normal wear and tear and are not covered under this limited warranty.

Rev.	Description	Date	Init.
-	Initial Release	9/3/13	ME



W1 - 910XXX
W2 - CAT3 PHONE CORD, 8'
W3 - AC POWER CORD, 6'
W4 - CAT5 PATCH CABLE, 6'
W5 - DB9M/DB9F SERIAL CABLE
(ASSMANN AK131-2-R) , 6'

CONNECTORS:

J1 - SRI P/N 500074
J2 - DGB9MF
J3 - ECF504-BAS
J4 - ECF504-R5E
J5 - ECF504-6S

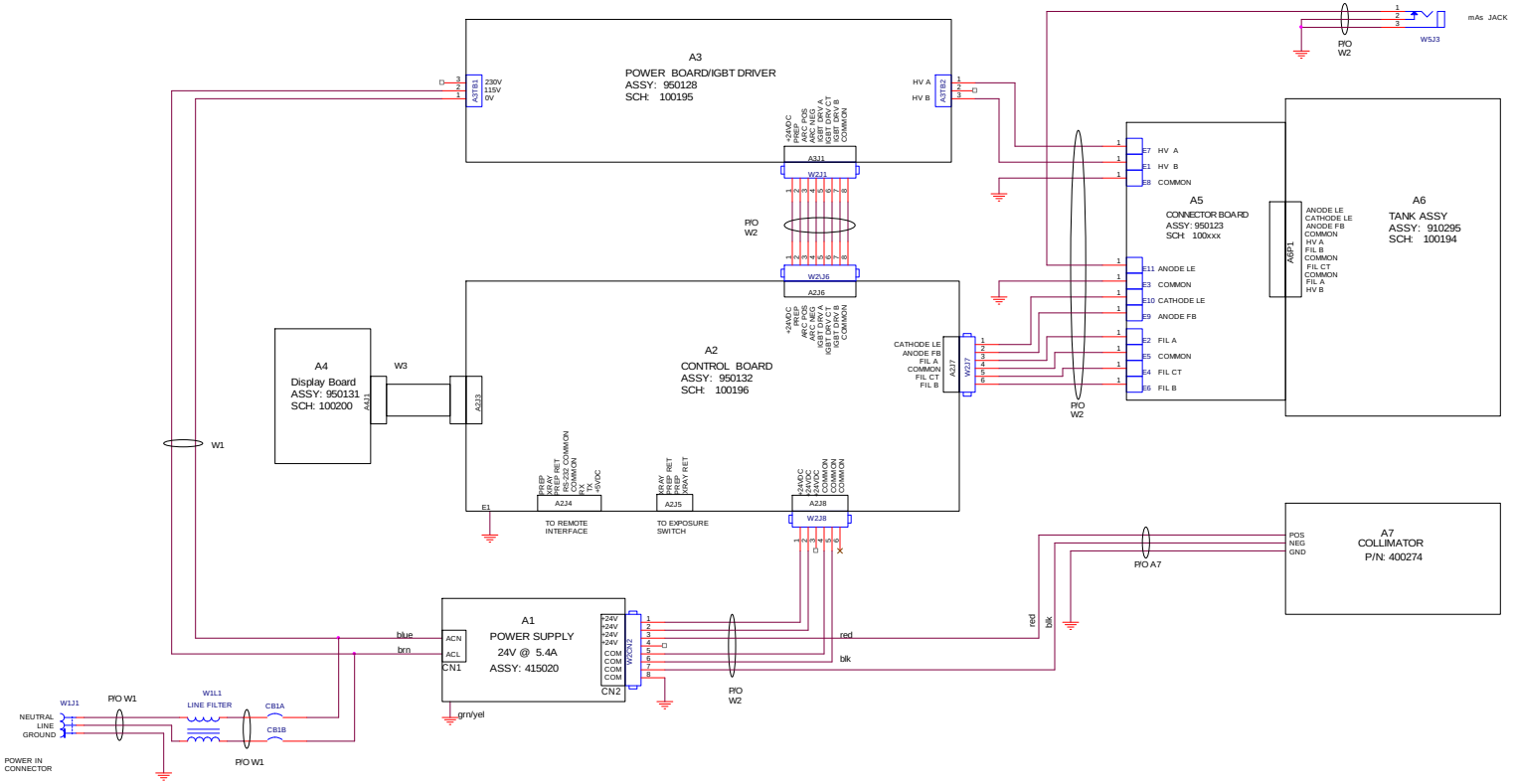
Proprietary Note
The information contained herein is confidential and proprietary information of Source-Ray, Inc. which shall not be disclosed to any third party without the express prior written consent of Source-Ray, Inc.

Source-Ray, Inc.
50 Fleetwood Ct. Ronkonkoma, NY 11779

Drawn By: M.EDER	Date: 9/3/13	PXS-710D SCHEMATIC BASE WIRING DIAGRAM
Checked By:	Date:	Material: N/A; Drawing No: 100208; Rev.: A
Approved By: V. Milonas	Date: 10/3/13	Size: B; Scale: 1:1; Sheet 1 of 1

Tolerances: Fractions +/- 1/64; Decimals .xx +/-0.01, .xxx +/-0.001; Angles +/- 30'

Rev.	Description	Date	Init.
0	Initial Release	8/5/13	ME



Harness Assemblies:
1) W1 - 910299
2) W2 - 910300
3) W3 - 910301

Proprietary Note The information contained herein is confidential and proprietary information of Source-Ray, Inc. which shall not be disclosed to any third party without the express prior written consent of Source-Ray, Inc.		**Source-Ray, Inc.** 50 Fleetwood Ct. Ronkonkoma, NY 11779
	Drawn By: M. Eder Date: 8/5/13	GENERATOR SCHEMATIC (PXS-710)
Tolerances: Fractions +/- 1/64 Decimals .xx +/-0.01 .xxx +/-0.001 Angles +/- 30'	Checked By: V. Milonas Date: 8/9/13	Material N/A Drawing No 100206 Rev. 0
	Approved By: V.Milonas Date: 8/15/13	Size C Scale 1:1 Sheet 1 of 1

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